

AAI AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

FEBRUARY 15, 1958

In This Issue

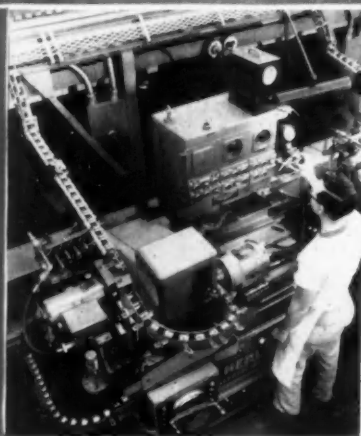
New Design and Construction of Air Springs
Assembling Lincoln and Continental Automobiles
More than 200 Presses Used in Cadillac Plant
Car and Truck Rentals Increasing in Volume
Retarder Systems for Heavy Vehicles in Europe
New Engine Developments at National Boat Show

COMPLETE TABLE OF CONTENTS, PAGE 3

A C H I L T O N P U B L I C A T I O N



Over 70 Heald Internals
precision grind
60 MILLION
Bearing Races a Year at
The Timken Company's
"AUTOMATIC FACTORY"



These two rows of Heald Model Centri-Matics, on lines four and of the Cone Finishing Department Bucyrus, grind bearing cone bores tolerance of .0005. Cycle time ran from 14 to 25 seconds, depending size and stock removal.

Close-up view of one of the 29 Model 190 Centri-Matics showing conveyorized workhandling equipment. parts come to the inclined load chutes from the conveyor belt at left. As the cones leave the machine through the unloading chute they are demagnetized. The sizing gage on machine permits quick checking tolerances.

From raw tube stock to precision-finished bearing races, untouched by human hands! This—the ultimate in automation—has been successfully achieved at the Bucyrus, Ohio, plant of The Timken Roller Bearing Company. Here, a total of 60 million cups and cones a year are rolling off of America's most fully automated production lines. Sixty million individual bearing races—formed, heat treated, machined and sized in one continuous, fully automatic cycle.

The I.D.s of all races are finish ground on Heald Centerless Internals—13 No. 10 machines for tapered bores of outer races and 29 Model 190 Centri-Matics for straight bores of inner races. These are *standard*

machines, fully automatic in loading, cycling and unloading. Hence they were integrated into the automated production line simply by the application of suitable conveyorized workhandling equipment.

For complete information on these or any other internal or rotary surface grinders, just get in touch with your Heald engineer.



**IT PAYS TO COME
TO HEALD!**

THE HEALD MACHINE COMPANY

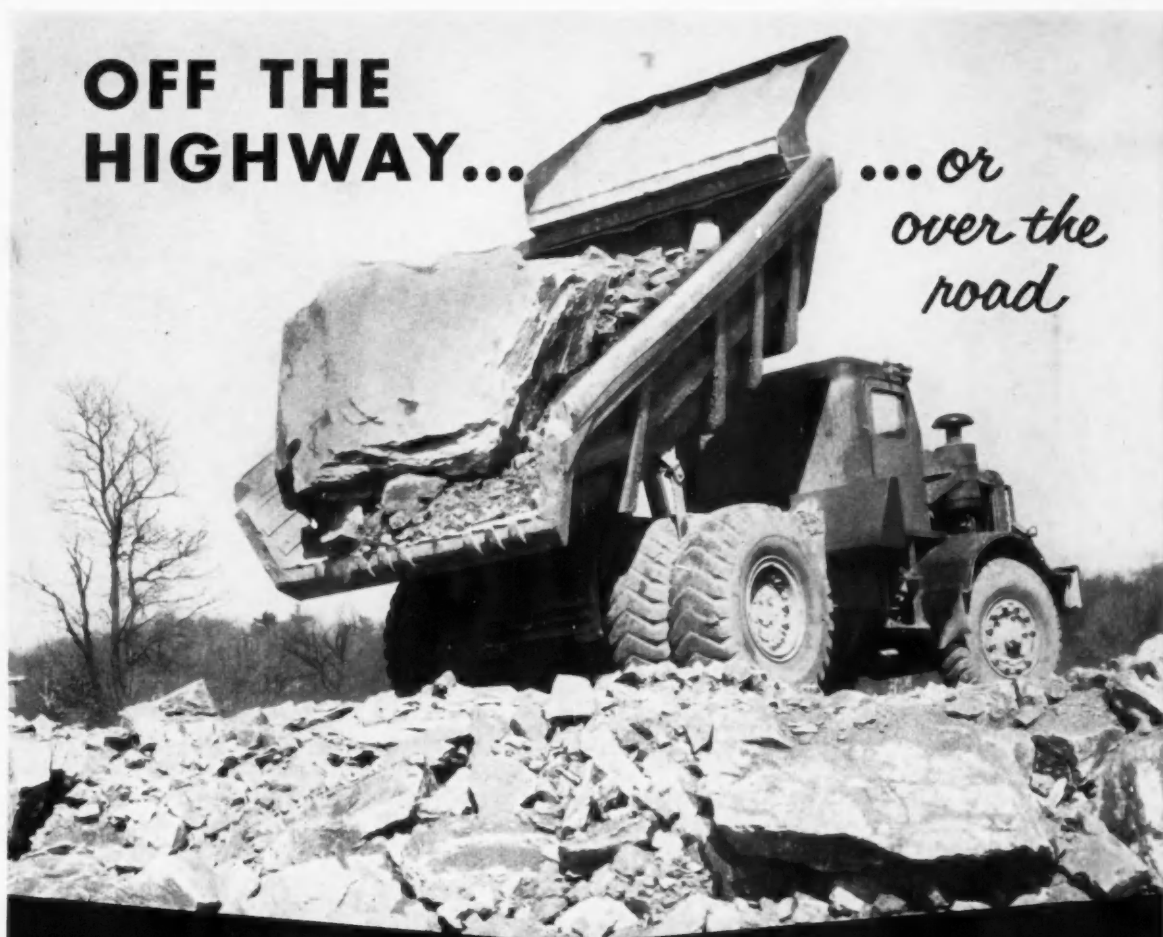
Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

**OFF THE
HIGHWAY...**

*...or
over the
road*

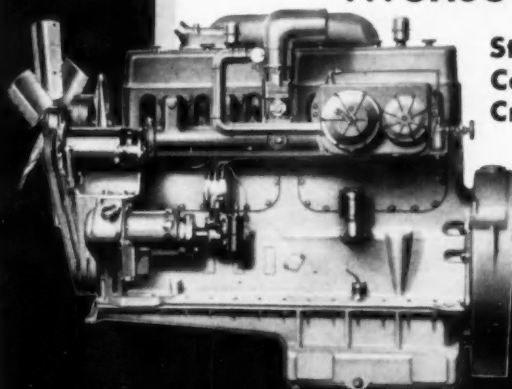


WAUKESHA ENGINES

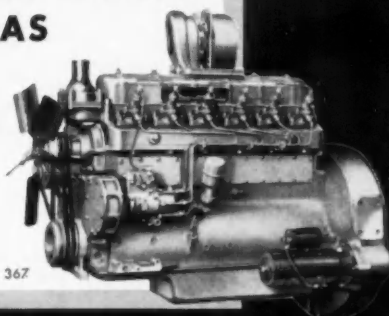
**NORMAL and TURBOCHARGED DIESELS
...GASOLINE... LP GAS**

**Standard or
Counterbalanced
Crankshafts**

*Write for
descriptive
bulletins*

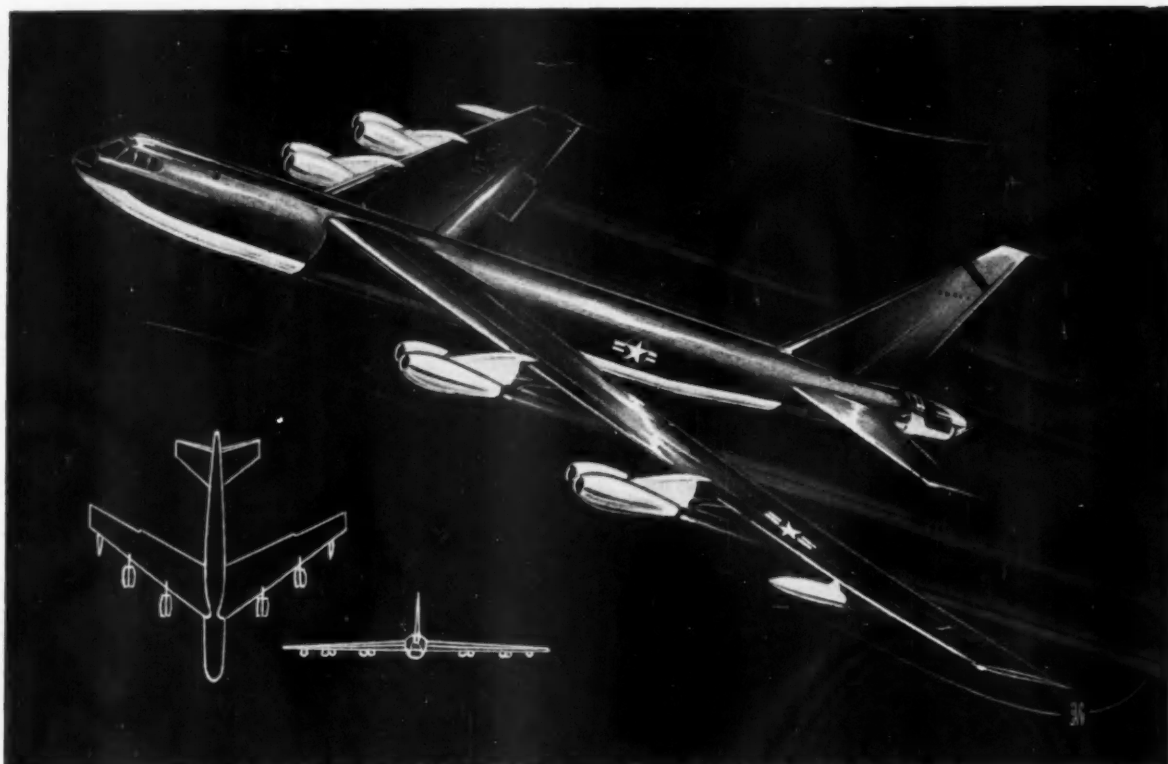


Waukesha WAKB—Equipped for Butane—6-cylinder,
6 1/4 x 6 1/2-in., 1197 cu. in., 300 max. hp @ 1800 rpm.



Waukesha 197-DLCS Turbocharged Diesel
(also normally aspirated)—6-cylinder,
4 x 4-in., 302 cu. in., 131 max. hp @ 2800 rpm.

WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin • New York • Tulsa • Los Angeles



B-52 Stratofortress — This global bomber is powered by eight J-57 turbo-jet engines, paired in sharply-raked forward pods. Her service ceiling is above 50,000 feet.

Designer stuffs a gasket so B-52 can flex its wings

The Inco Nickel Alloy that gives gaskets for hot gas ducts in the B-52 their "give" may prove useful to you.

Imagine a gasket that stays lively during repeated flexing at temperatures up to 600°F.

What material would you use?

Designers of the B-52 did it with Inconel® nickel-chromium-iron alloy knitted mesh stuffed into a hollow ring.

It's the "give" in this wire mesh and tube retainer that helps the gas-

ket maintain its perfect seal.

What gives the retainer its "give" at high temperatures?

Inconel alloy's outstanding resistance to relaxation in the 500° to 700°F. range which is why Inconel alloy is used for high temperature springs. This Inco Nickel Alloy also provides a combination of other useful properties: good strength, ductility and resistance to oxidation at high temperatures.

Where should you use special alloys?

Have a chat with Inco's Mechanical Engineering Section. Their wide experience in the application and performance of Inco Nickel Alloys may prove helpful in finding alloys to meet metal problems in many different areas. As a starter — outline your problem and send it to:

The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.



Inco Nickel Alloys

are marketed under the following trademarks:
MONEL • "R" MONEL • "K" MONEL • "KR" MONEL
"S" MONEL • INCONEL • INCOLOY • "X" • INCONEL
"W" • INCONEL "700" • INCOLOY • INCOLOY "T"
INCOLOY "901" • NIMONIC Alloys

Where Inco Nickel Alloys are used in jet aircraft

Inconel	Inconel "X"	Nimonic Alloys	Inconel "W"
Combustion liners	Rotor discs	Combustion liners	Tail cones
Transition sections	Afterburner bellows	Transition sections	Afterburners
Insulating blankets	High-temperature bolts	Vaporizer tubes	Inconel "700"
Lock wire and rivets	Rocket engine rotors	Turbine blades	Turbine blades
Fuel line tubing		Rotor discs	
Incoloy "T"	Monel	"S" Monel	
Transition sections	Lock wire	Ball bearing retainer	Pure Nickel for electrical
Combustion liners	Fine fuel line	rings	and electronic gear. Pri-
Incoloy "901"			mary Nickel as alloying
Turbine discs			element in other materials. Inco
			Precision Castings in many different alloys.

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

FEBRUARY 15, 1958

VOL. 118, NO. 4

FEATURES

Assembling Lincolns and Continentals. By Joseph Geschelin	48
New Design and Construction of Air Springs....	50
Rising Volume of Car and Truck Rentals Spurs Sales. By Andrew W. Shearer.....	58
New Engines and Accessories at the National Motor Boat Show. By Charles A. Weinert....	60
The Spicer Synchro-Master Transmission.....	63
Cadillac's Plant 4. By Joseph Geschelin.....	64

Huge Expansion Ahead to Meet Market Growth. By Hugh Quinn	69
Retarder Systems for Heavy Vehicles in Europe. By Robert Braunschweig.....	70
Industry Statistics	94
Automotive Uses for Plastics Discussed at SPE Conference. By Joseph Geschelin.....	100
High-Efficiency Painting Equipment at B-O-P Assembly Plant	102

NEWS BRIEFS

Big Three Engineers Air Small Car Plans.....	33
Dodge Adds Economy Model	33
Thunderbird To Bring Out Soft-Top Convertible	34
AMC Shows First Quarter Rise.....	34
Chevrolet Builds 9 Millionth Truck.....	34
Ford Plans to Boost Imports of English Cars....	35
Firestone Develops New Tire.....	35
China's Automotive Industry Seeks Aid.....	36
Continental Motors Doubles Earnings.....	36
Opel Imports on Schedule.....	37
Pontiac Imports 1500 Vauxhalls Per Month.....	37
AF Awards Contract for Landing System.....	38
Martin Begins Flight Tests of New Seamaster....	38
Chrysler Forms New Missile Division.....	39

DEPARTMENTS

Calendar of Coming Events.....	28
High Spots of This Issue.....	31
News of the Automotive and Aviation Industries	33
Men in the News.....	41
Machinery News. By Charles A. Weinert.....	79
New Plant and Production Equipment.....	80
Free Literature and Free Information Service....	89
New Automotive and Aviation Products.....	92
Airbriefs. By Ralph A. McClarren.....	96
The Business Pulse	98
Construction Equipment Trends. By Kenneth Rose	104
On Our Washington Wire	125
Shorties	162
More Government Contract Awards.....	164

Business Department and Staff.....	31
Chilton Officers and Directors.....	31
Advertisers' Index	188

EDITORIAL STAFF

JAMES R. CUSTER, Editor
H. H. ROBERTS, Engineering Editor
ANDREW SHEARER, Market Research Editor
ROBERT P. HOMER, Editorial Production Mgr.
DAVID A. PARTRIDGE, Aviation Editor
MARCUS AINSWORTH, Statistical Editor
SAMUEL CUMMINGS, News Editor
HOWARD KOHLBRENNER, Art Director

DETROIT
Joseph Geschelin, Detroit Editor
Hugh C. Quinn, Detroit News Editor
PHILADELPHIA & NEW YORK
Charles A. Weinert, Eastern Editor
WASHINGTON
George H. Baker, Washington Editor
Ray M. Stroupe, Wash. News Editor
Nell R. Regeimbal, Wash. News Editor

CHICAGO
Kenneth Rose, Mid-West Editor
LOS ANGELES
R. Raymond Kay, Pacific Coast Editor
BERN
Robert S. Braunschweig, European Correspondent
LONDON
David Scott, British Correspondent

Paul Wooten, Washington Member, Editorial Board

As part of its worldwide automotive and aviation news coverage, AUTOMOTIVE INDUSTRIES is serviced by International News Service and has editorial correspondents in major United States and Foreign industrial centers

MEMBER



National Business Publications, Inc.



Audit Bureau of Circulations

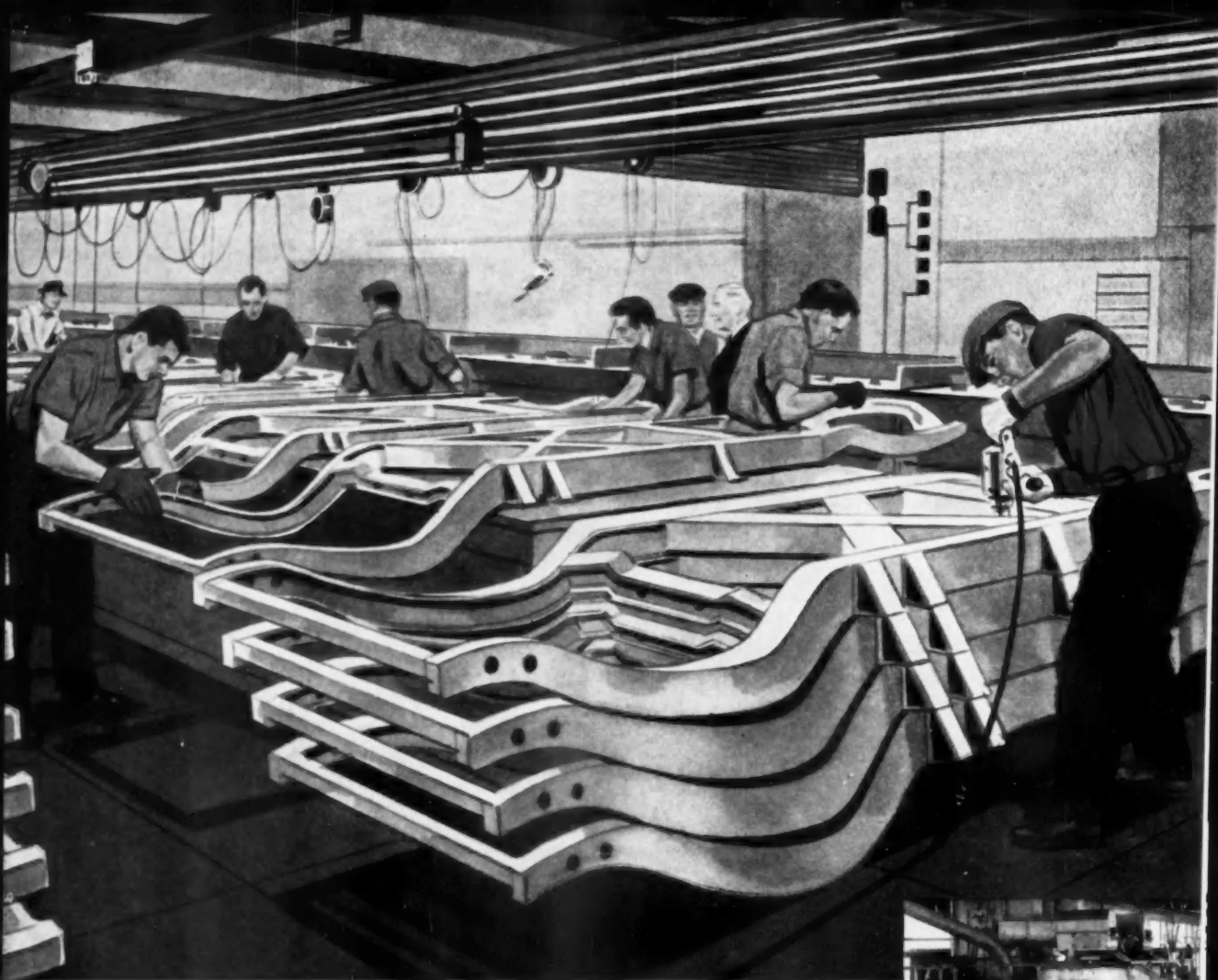
Copyright 1958 by Chilton Company

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1916.

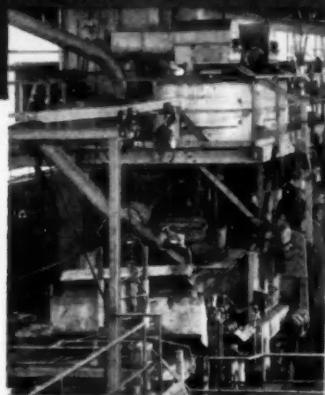
EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S., U. S. Possessions and Canada, \$2.00 per year; \$3.00 for 2 years. All Others, \$10.00 per year. Single copies, 50¢. Statistical Issue, \$1.00.

AUTOMOTIVE INDUSTRIES, February 15, 1958



One of the most efficient manufacturing operations in industry today is the production of automobile frames. For better, faster descaling, three of the four producers in this field have selected Pangborn Rotoblast Descaling Equipment.



ROTOBLAST replaces pickling at Midland Steel.

Clean it fast with

Pangborn

ROTOBLAST®

PANGBORN CORPORATION, Hagerstown 3900, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment

**Here's the way
to MODERNIZE your
Forge Shop**

Economically • Quickly

**Put
CECO-DROP
upperworks
on your
board drop
anvils—**



For quick modernization at a minimum cost, investigate the possibility of fitting Ceco-Drop upperworks to your present board drop anvils and foundations.

You can have the benefit of all the advantages and exclusive features of the Ceco-Drop without being involved in the time and expense of replacing the anvil or disturbing the foundation.

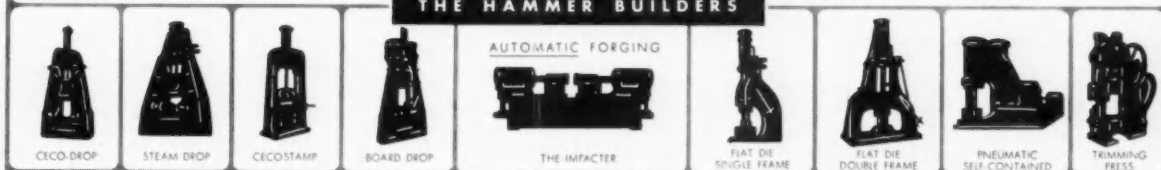
With the Ceco-Drop upperworks, you'll have improved production rates, economies in operation and operator satisfaction that will well repay the investment.

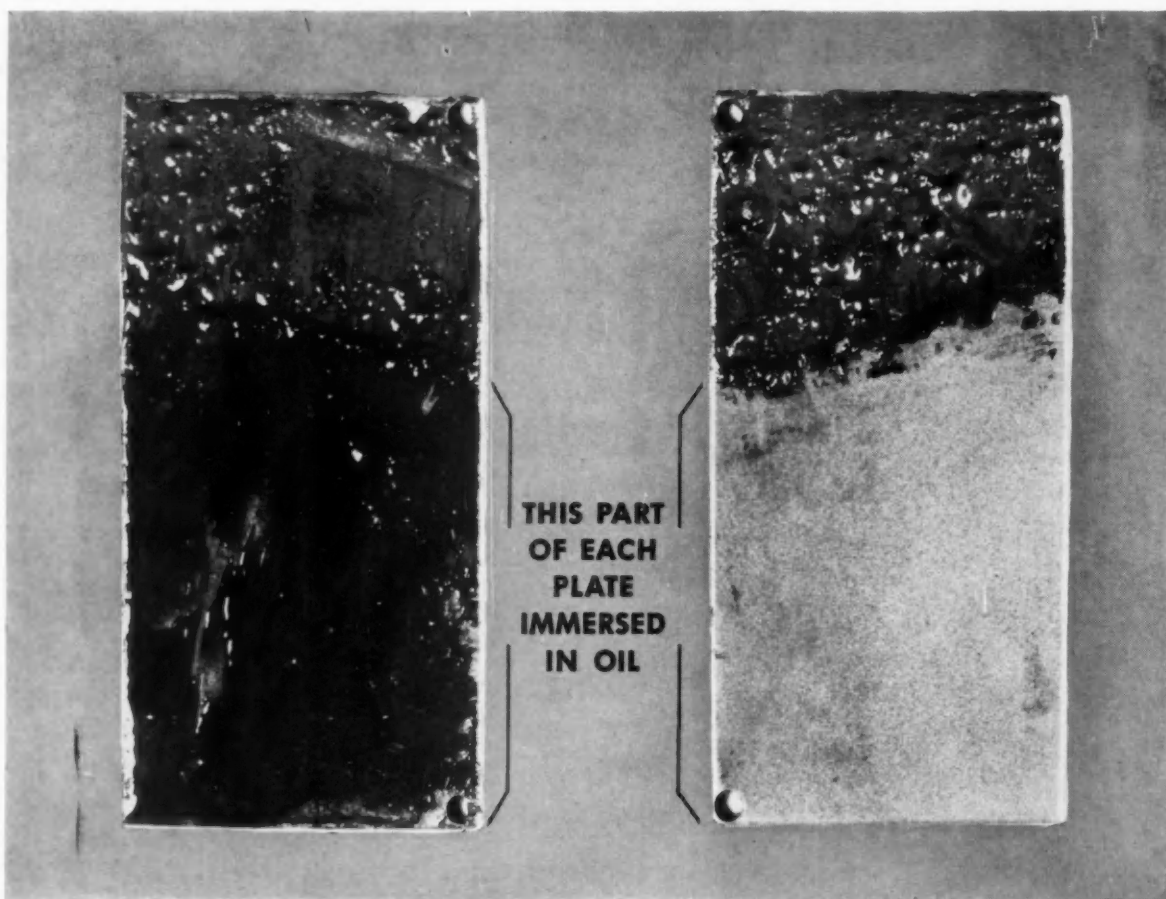
Write or phone us.

CHAMBERSBURG ENGINEERING COMPANY CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS





This sludge-coated metal plate was partially immersed in a beaker containing a *regular hydraulic oil* heated to normal operating temperature. Though the oil was agitated throughout the test, nearly all the sludge remained on the plate.

This similarly sludge-coated plate was partly immersed in a **SUNVIS 700** oil, also heated to normal operating temperature. During the same period, with the same degree of oil agitation, the immersed part of the plate was rinsed clean of sludge.

Simple test shows how

SUNVIS 700 OILS CLEAN HYDRAULIC SYSTEMS...WITHOUT SHUTDOWNS

Sunvis* 700 oils clean while they work. Their cleansing action removes deposits in systems contaminated by dust, sludge, varnish, and other foreign materials.

SUNVIS 700 oils carry these contaminants in suspension for easy removal. This eliminates costly teardowns. Systems stay clean. In addition to being ideal for hydraulic systems,

SUNVIS 700 oils are also suited for circulating systems and gear boxes.

If you want exceptional cleaning ability, oxidation stability, rust prevention, film strength, you need SUNVIS 700 oils. Ask your Sun representative for full details, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AA-2.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

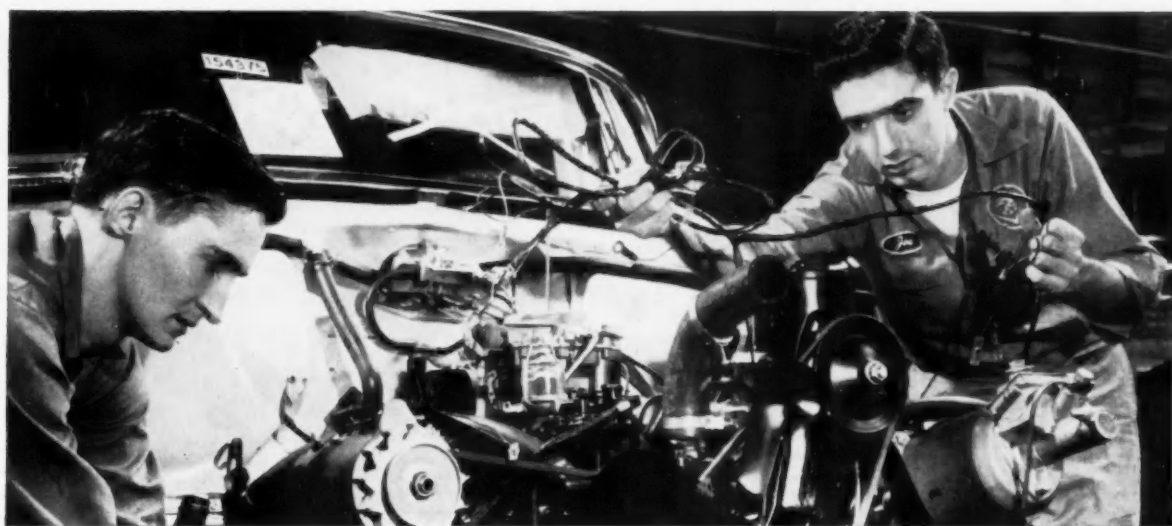


*TRADEMARK

AUTOMOTIVE INDUSTRIES, February 15, 1958



FACT / *The extra care Packard takes here!*



RESULTS / *In extra savings for you here!*

When you snap on a Packard Electric wiring harness, you know *it's right!* Packard Electric harness designers have worked closely with you and your component-part suppliers, so when the assembly line is reached, everything keeps going like clockwork.

Another thing about Packard Electric wiring harnesses: All the parts are made and assembled at Packard.

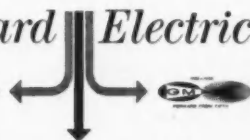
This provides a quality control that is unique in the cable industry, and results in saving you money, time and trouble. What's more, every tenth Packard Electric employee is a fully trained inspector who uses the latest testing mechanisms, plus his own experience, to give you perfection in every unit.

If you are not already using Packard harnesses, as many automotive

manufacturers do, it will pay you to start doing so soon. Packard Electric maintains offices in Detroit, Chicago and Oakland, California, for your convenience.

Packard Electric

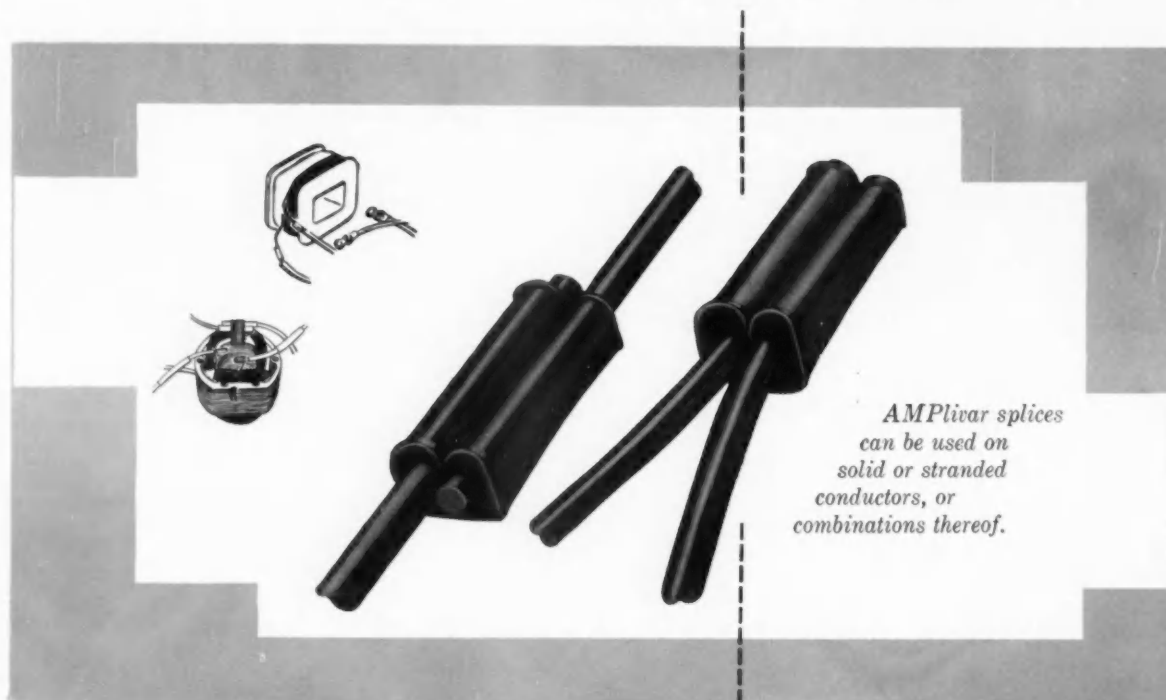
Warren, Ohio



"Live Wire" division of General Motors

the NEW AMPlivar splice plus new horizontal machine

for identical, mass produced splices of enamel, poly-vinyl acetal and similarly coated wire



AMPlivar splices can be used on solid or stranded conductors, or combinations thereof.

AMPlivar splices, with multiple ring stripping action, eliminate scraping, dissolving in solvents, burning, or other methods for removing insulation. Included among its many other features are:

- NO HEAT DAMAGE TO WIRE OR INSULATION—as often occurs in alternate methods of splicing.
- SMALL SIZE—scarcely larger than the wires themselves, but design-engineered to lock wire and connector into a high tensile strength splice.
- CORROSION RESISTANT—the joint is hermetically sealed during splicing.
- LOWER INSTALLED COSTS—eliminates soldering materials and equipment ... requires less wire ... reduces time required to make the splice.

Further information is available on request.



This cutaway of the AMPlivar splice shows how conductor material extrudes outwardly into serrations for added strength and electrical contact. The splice is as corrosion resistant as the wire itself.



IDEAL FOR ASSEMBLY LINE PRODUCTION... the AMP Horizontal Auto-machine uses AMPlivar splice connectors in strip form, for automatic splicing as fast as the operator can insert the wires.

AMP INCORPORATED **AMP**

General Office, 2213 Eisenhower Boulevard, Harrisburg, Pa.

Wholly Owned Subsidiaries: Aircraft-Marine Products of Canada Ltd., Toronto, Canada
Aircraft-Marine Products (G.B.) Ltd., London, England • Societe AMP de France,
Le Pre St. Gervais, Seine, France • AMP—Holland N.V. 's Hertogenbosch, Holland
Japanese Distributor: Oriental Terminal Products Co., Ltd., Tokyo, Japan



This Auto Muffler Lasted 72 Months

It's Made of Armco ALUMINIZED STEEL

Six years' service life is an excellent record for any kind of muffler. This muffler is of common design. The only thing different about it is the special steel from which it's made—Armco ALUMINIZED STEEL.

Of course, car owners don't always get this kind of life, even from mufflers made of ALUMINIZED STEEL. But actual road tests show that mufflers made from this special hot-dip aluminum-coated steel average at least *twice the life* of their carbon steel counterparts.

HERE'S THE REASON

Superior resistance to combinations of heat and corrosive exhaust gases is the reason why mufflers made of Armco ALUMINIZED STEEL last so much longer. As a result, early failures are reduced. Mufflers are much more likely to span the vital first-owner period.

Here's another important fact: This remarkable steel is available at less cost than any other metal with comparable resistance to a combination of heat and corrosion.

For complete information about this economical steel for longer-lasting mufflers, just fill in and mail the coupon or phone your nearest Armco Sales Office.

Other Armco Steels for top-quality automotive products include Stainless Steels in all forms, ZINCGRIP®, ZINCGRIP PAINTGRIP®, Cold-Rolled PAINTGRIP, Long Ternes, Steel Tubing, and high-quality Hot- and Cold-Rolled sheets.

ARMCO STEEL CORPORATION, 1278 Curtis Street, Middletown, Ohio

Send me more information about Armco ALUMINIZED STEEL Type 1.

Name _____

Firm _____

Street _____

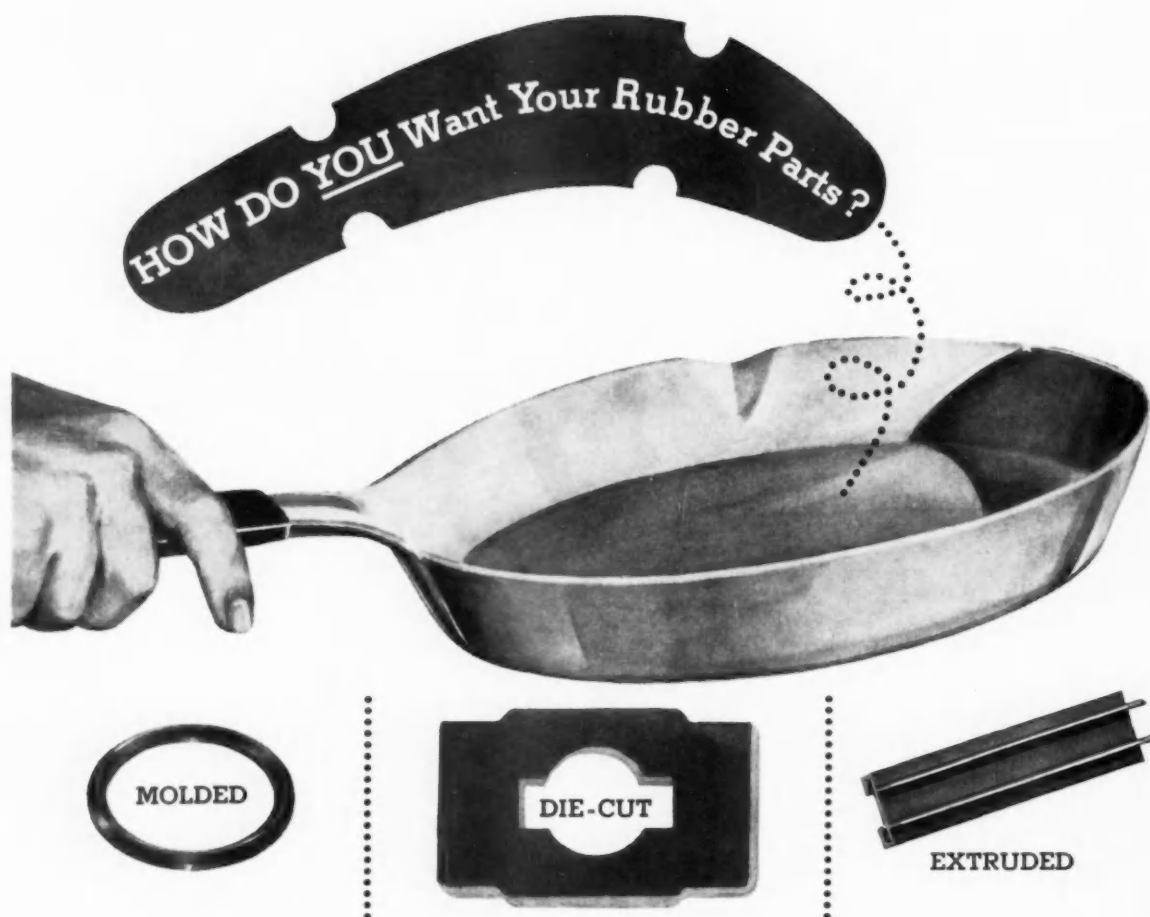
City _____ Zone _____ State _____

ARMCO STEEL



ARMCO STEEL CORPORATION, 1278 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



ACADIA *Has 'em All Three Ways*

Every customer has a right to his synthetic rubber parts the way he wants them.

The more complicated the requirements, the easier for our engineers at Acadia to go to work. Our long experience guides us in giving you exactly the characteristics you desire. We process synthetic components, for oil-resistance, good aging properties, strength, compression-deflection, or any combination you specify.

And if you require resistance to heat or cold, remember Acadia SILICONE rubber

stays resilient at 100° below zero or 500° above. Silicone is molded or extruded for gaskets, seals, "O" rings, washers, sheets, cut-parts and packings.

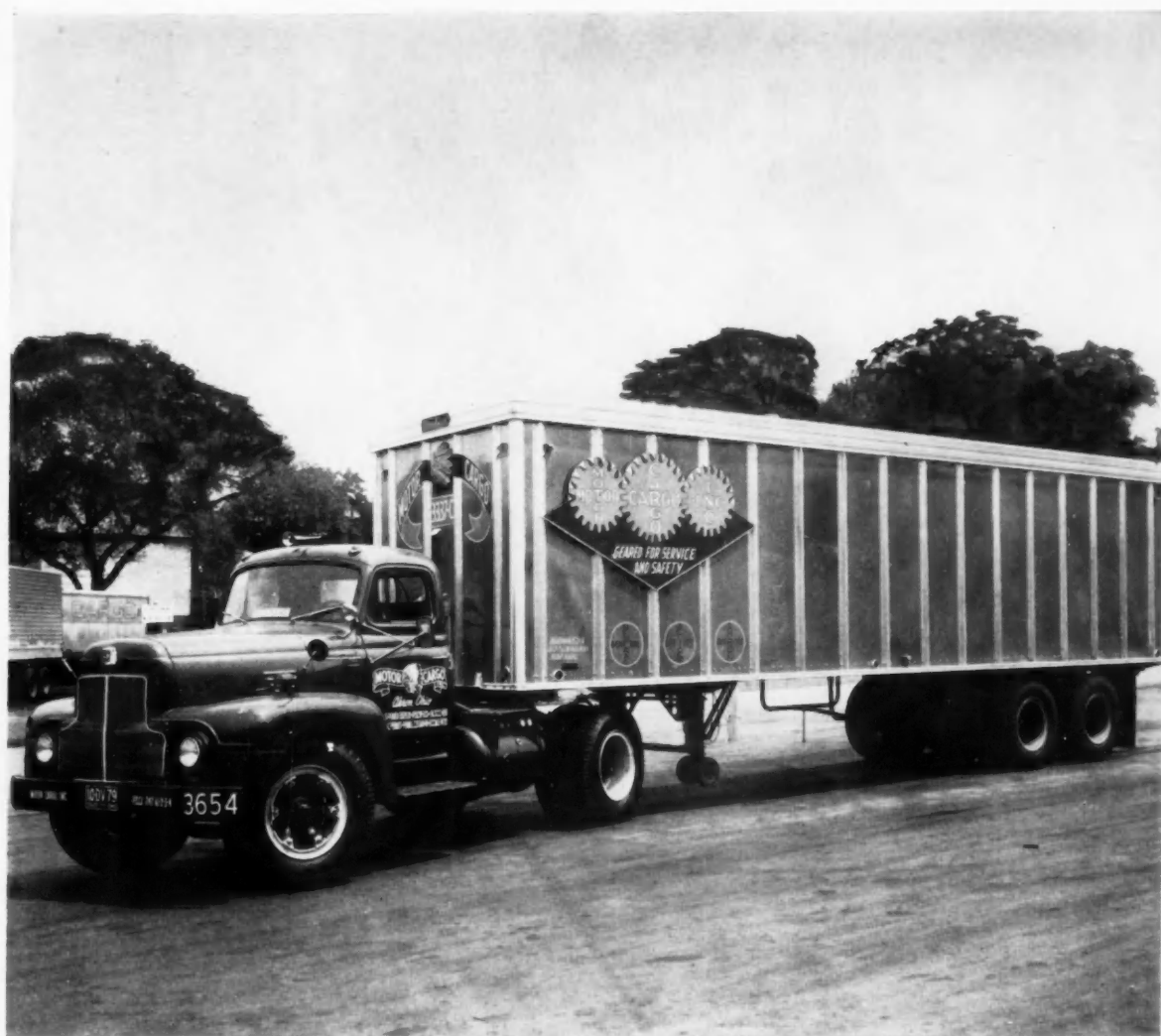
There is an Acadia Sales Engineer serving your area. A letter will put him in touch with you immediately.

ACADIA *Synthetic* **PRODUCTS**

DIVISION OF WESTERN FELT WORKS
4021-4139 West Ogden Avenue, Chicago 23, Illinois
Branch Offices in Principal Cities



MANUFACTURERS AND CUTTERS OF WOOL FELT



Geared by FULLER...

415 durable Fuller Transmissions cut Motor Cargo's maintenance costs

"The 415 Fuller 5-speed 5-A-43 Transmissions in our fleet give a long useful life of approximately 325,000 miles in 3 years, before we put them on city pick-up work for another 3 years. Maintenance cost is extremely low," says Joseph B. Boynton, Superintendent of Equipment and Garages for Motor Cargo, Inc., Akron, Ohio.

Fuller Transmissions provide not only long and satisfactory service but

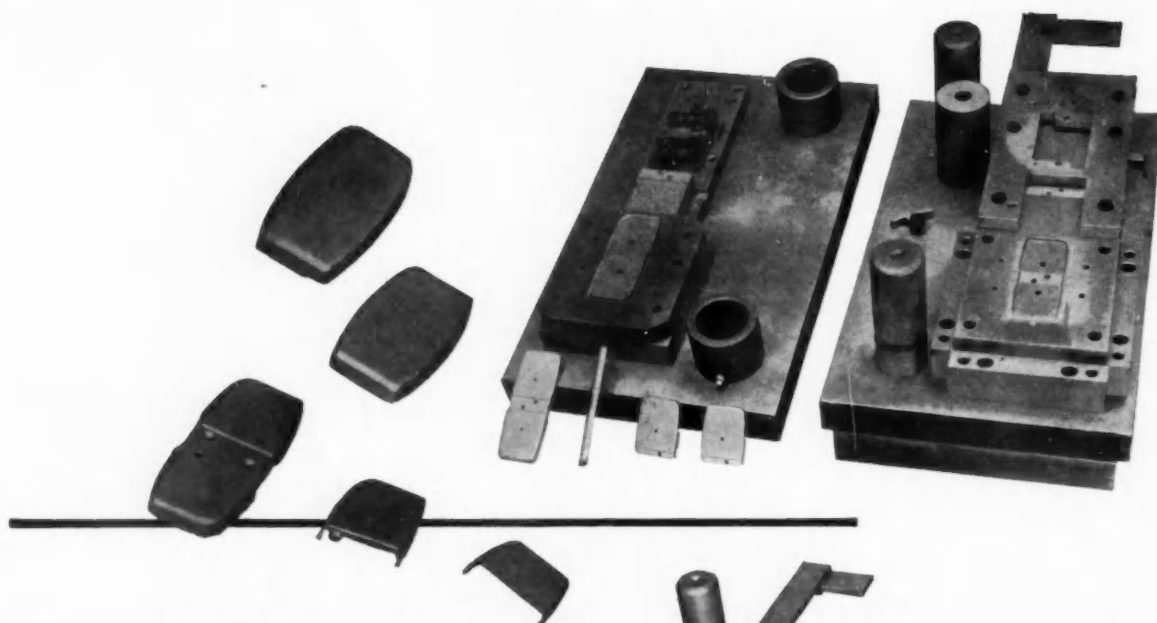
also they help pull the payloads through on schedule. *Right* gear ratios, smoother shifting, faster trip time, longer engine life . . . add up to greater profits for Fuller Transmission users.

Ask your truck dealer now for full details on the most efficient, easiest-shifting Fuller Transmission . . . designed with your specific job and equipment in mind.

Above: Motor Cargo rig—International Tractor is equipped with 5-A-43 Fuller Transmission.

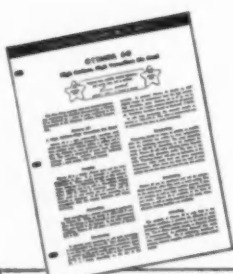


FULLER MANUFACTURING CO. Transmission Division • Kalamazoo, Mich.
Belt Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville,
Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch,
Oakland 8, Cal. and Southwest. Dist. Office, Tulsa 3, Okla.



These OTTAWA 60 DIES PAYOFF BIG IN 3 WAYS

- ★ Buffing Time Reduced 1/2
- ★ Rejects Reduced 20%
- ★ Stoning and Regrinding
of Dies Reduced 75%



Write for BLUE SHEET on OTTAWA 60

This concise four-page folder gives all needed handling and shop treatment details on Ottawa 60. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. Ask for your copy.

ADDRESS DEPT. AI-2

W5W 6648

One way to increase profits is to reduce finishing costs. That's what a fabricator of hearing aid cases accomplished when he switched from regular die steel to A-L's air hardening Ottawa 60 high carbon-high vanadium grade.

Ottawa 60 dies produced stainless steel cases which were free from galling and scoring—were nearly perfect as they came out of the dies. Less than half the previous buffing time was needed to bring them to the required high finish. Rejects—which ran about 20 percent before the use of Ottawa 60—were reduced almost to the point of elimination. Also, the new

Ottawa 60 dies required stoning and regrinding only a quarter as often as the standard tool steel dies they replaced.

This same manufacturer has passed along significant savings to other customers through the use of Ottawa 60. By practically eliminating rejects due to corner cracking and scoring, customers receive better stamped parts at lower per-piece cost.

Let us show how you, too, can save with A-L tool steels and, at the same time, furnish your customers a better product.

Allegheny Ludlum Steel Corporation,
Oliver Building, Pittsburgh 22, Pa.

For nearest representative, consult Yellow Section of your telephone book.

For complete **MODERN** Tooling, call
Allegheny Ludlum



Some pick a 6 • Some take an 8



BOTH CAN HAVE THOMPSON POSITIVE VALVE ROTATION

Any truck engine being built today can easily be factory-equipped with Thompson-developed "Rotocaps" or "Rotocoils" that provide *positive* rotation of exhaust valves on every stroke.

Thompson rotation on your truck valves reduces operating costs in these ways:

- Burned and stuck valves are eliminated
- Valve seats are wiped clean for better compression sealing
- Down-time on road is reduced
- Valve stem and guide wear is equalized
- Fuel economy and horsepower are improved
- Longer time between valve overhauls
- Horsepower stays at peak longer

Next time you order trucks, specify factory-installed Thompson "Rotocaps" or "Rotocoils". They're readily installed in engines of any design and any size, 6 or 8. To learn more about these *positive*-rotation units for valves, write us for Booklet 3.



ROTOCAP



ROTOCOIL



Valve Division Thompson Products, Inc.

Dept. AI-258 • 1455 EAST 185th STREET • CLEVELAND 10, OHIO



Engineered by Tinnerman...

Pea-size **SPEED CLIP**® saves space in missile, makes servicing of transistors easier

Tiny transistors that trigger the controls on a missile or supervise the sequencing on a jet engine are now plugged into pea-size Tinnerman SPEED CLIPS.

A thumb-push locks these front-mounting tubular SPEED CLIPS into punched holes in circuit panels. There's no soldering or riveting, no need for special tools. Spring-steel fingers hold tight; assure a vibration-free assembly. The fully encaged transistor is provided with excellent heat dissipation and can be readily removed for servicing. The SPEED CLIPS can be reused over and over again.

Tinnerman SPEED NUT® Brand Fasteners can save time and money on your production line, too, whether you require a specially engineered fastener or select one of the 9000 variations of existing designs. SPEED NUTS are easy to use, can be applied quickly anywhere along your production line, assuring quality, vibration-proof attachments at low cost.

Discuss your fastening needs with your Tinnerman representative . . . he'll have SPEED

NUT ideas to help you make an even better product, at lower cost. You'll find him listed in all major telephone directories. Or write to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

TINNERMAN

Speed Nuts®



FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Accessories Ltd., Trofrest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

Save 27% or more in cost...

NEW

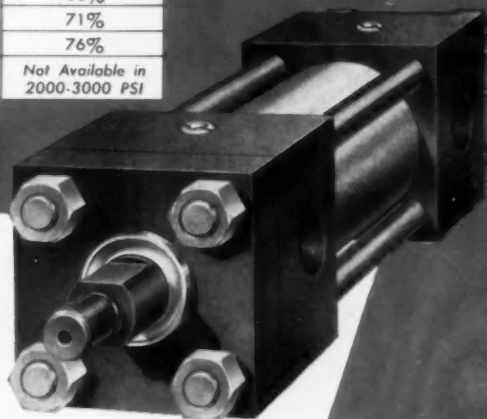


"JOB RATED"

HYDRAULIC CYLINDER LINE

JOB RATED, MODEL "LH"

BORE	CONTINUOUS SERVICE RATING	INTERMITTENT SERVICE RATING	YOU SAVE THIS % IN PRICE OVER STANDARD 2000-3000 PSI CYLINDERS
1 1/2"	1500 PSI	2500 PSI	27%
2	1500	2500	27%
2 1/2	1000	1500	28%
3 1/4	1500	2500	32%
4	1000	1500	35%
5	800	1200	37%
6	800	1200	43%
8	500	800	50%
10	500	800	71%
12	500	800	76%
14	500	800	Not Available in 2000-3000 PSI



with **IDENTICAL** seals, design, and safety factors as the famous Miller "Power-Packed" Model "H" Line for 3000-5000 psi service.

ALL TEFLON* SEALED AGAINST EXTERNAL OIL LEAKAGE

SHEP SEAL At Tubing Ends

Has zero axial clearance, metal backup, no "blind assembly." Teflon sealing strip of one cross-section dimension for all cylinder sizes—supplied on convenient spools.

Shear-proof
Heat-proof
Extrusion-proof
Fluid-proof

Piston Rod Flange Seal

Self-regulating, wear-compensating piston rod flange seal is pressure-energized, guaranteed leak-proof and never requires adjustment.

Teflon rod wiper keeps dirt out. Teflon hydraulic wiper keeps lubricant in.

Teflon sealing strip for bushing is one cross-section dimension for all cylinder sizes—supplied on convenient spools.

LOCK-SEAL

Cushion Adjusting Screw

Non-protruding screw automatically sealed and locked by Teflon ring. Interchangeable with ball check assembly for easy access.

CASE-HARDENED CHROME-PLATED PISTON RODS

Heat treated, stress relieved, high tensile steel piston rods, case-hardened, then hard chrome-plated.

NOW! . . . You can save MORE with quality Miller "Job-Rated" Cylinders than with cut-price, lesser quality hydraulic cylinders. And the "Job-Rated" Cylinders are also available under the same immediate shipment program (2 hours if necessary—3 days normal) as the Power-Packed Line.

*Du Pont trademark for its tetrafluoroethylene resin



OTHER MILLER QUALITY FEATURES

- Rust-Resistant Surfaces
- Interchangeable, Space-Saving Square, 4-Tie-Rod Design
- Air Bleed In Cylinder Head
- Precision Honed Barrels

MILLER FLUID POWER
DIVISION OF FLICK-REEDY CORPORATION

2028 N. Hawthorne Ave.

Melrose Park, Illinois

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

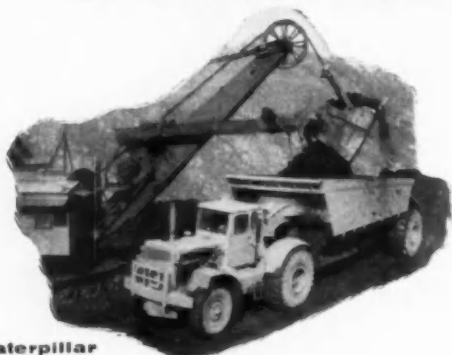


International



Diamond T

The BIG JOBS count on Thompson linkage, too



Caterpillar



Mack



Euclid

Four Wheel Drive

STEERING linkage, engineered and manufactured by Thompson Products' Michigan Division, isn't only used on leading passenger cars. Heavy duty vehicle manufacturers count on Thompson too, as you can see from some of the big jobs above. All of them are equipped with Thompson chassis parts.

Thompson is continually being called upon by the automobile, truck, farm machinery and off-the-road vehicle manufacturers to come up with new ideas and new manufacturing. Why don't you call or write Thompson's Michigan Division now for help with your problems. The address is 34201 Van Dyke, Warren, Michigan; the telephone number Jefferson 9-5500.

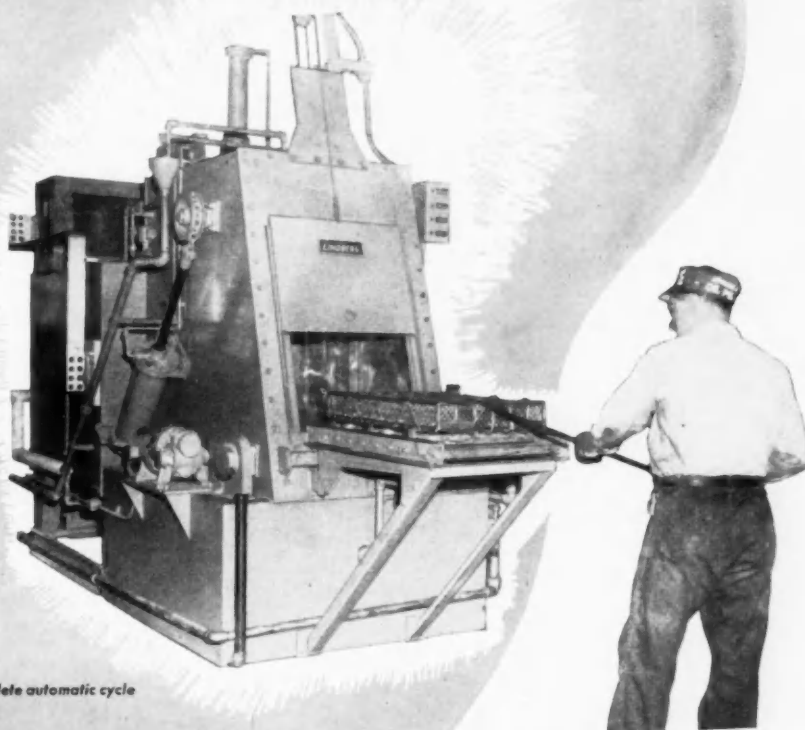
You can count on



Thompson Products

Michigan Division: Warren and Portland

Here's the work-horse for many a carbonitriding job

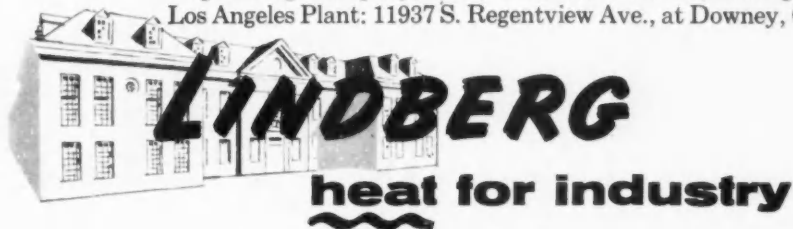


This furnace has complete automatic cycle and quench control.

This is the most widely-used carbonitriding furnace of all. Day in and day out production of tons and tons of work has proved this furnace's ability to increase production quality and volume and reduce costs. It is a versatile furnace, too, not only for carbonitriding but for other uses, carburizing, annealing, carbon restoration and many hardening applications.

This type of furnace is available for both manual and automatic operation. It can be equipped either with Lindberg's efficient new vertical radiant tubes for fuel-firing or for electric heating with Lindberg's revolutionary new CORR THERM element.

Versatile as this furnace is, we don't claim it is the best solution to every carbonitriding problem. But, whatever your need may be, talk it over with Lindberg. Our engineers, as they have done in so many instances, will recommend a sound answer—design it, build it, even field-install it if you wish. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality. Lindberg Engineering Company, 2491 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.





AMBALLOY...A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS

FROM HIGH-GRADE PRODUCTION FACILITIES...BETTER END PRODUCTS

The consistent quality of AMBALLOY[®] specialty steels—stainless, alloy and carbon—is rooted in the exacting quality control of our high-grade production facilities.

We match these facilities with sound furnace practice and skillful melting procedures. Precise control by men of ability and experience assure the quality of each heat. This detailed attention we give to every step of the steel-making

process means better end products for users of AMBALLOY.

And to provide you with helpful solutions to your material selection problems, Byers offers a staff of highly trained metallurgists. We can serve you with knowledge and facilities that put your order where you want it, when you want it. Check Byers first. Write or call for details. A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

A growth company with the emphasis on quality and service **A. M. BYERS COMPANY**

Right, 1/2-in. pitch,
1 1/16-in. wide
timing chain

This narrower timing chain has saved MILLIONS

of dollars for
leading car makers

*It's one of the reasons why so many
automotive designers are turning to
LINK-BELT 1/2-inch pitch timing chain*

SAVING even a fraction of an inch of car length can mean a substantial reduction in production costs. And by permitting use of narrower sprockets, shorter camshafts, crankshafts—and cutting overall length, where desired—Link-Belt 1 1/16-inch width timing chain has brought significant economies to many car manufacturers.

Originated by Link-Belt in 1949, this narrower, 1/2" pitch design has been adopted by more and more leading auto makers. And the fact that it has accommodated a better-than-100% horsepower increase on some engines testifies to its exceptional durability.

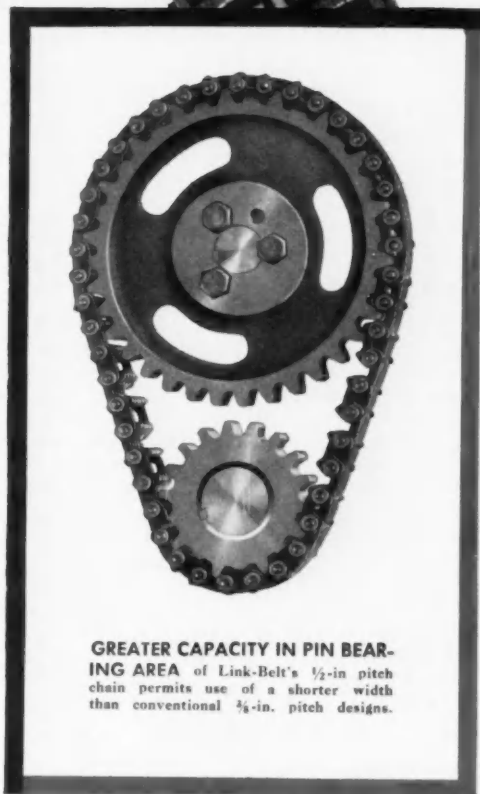
For more complete information, write for Book 2065.



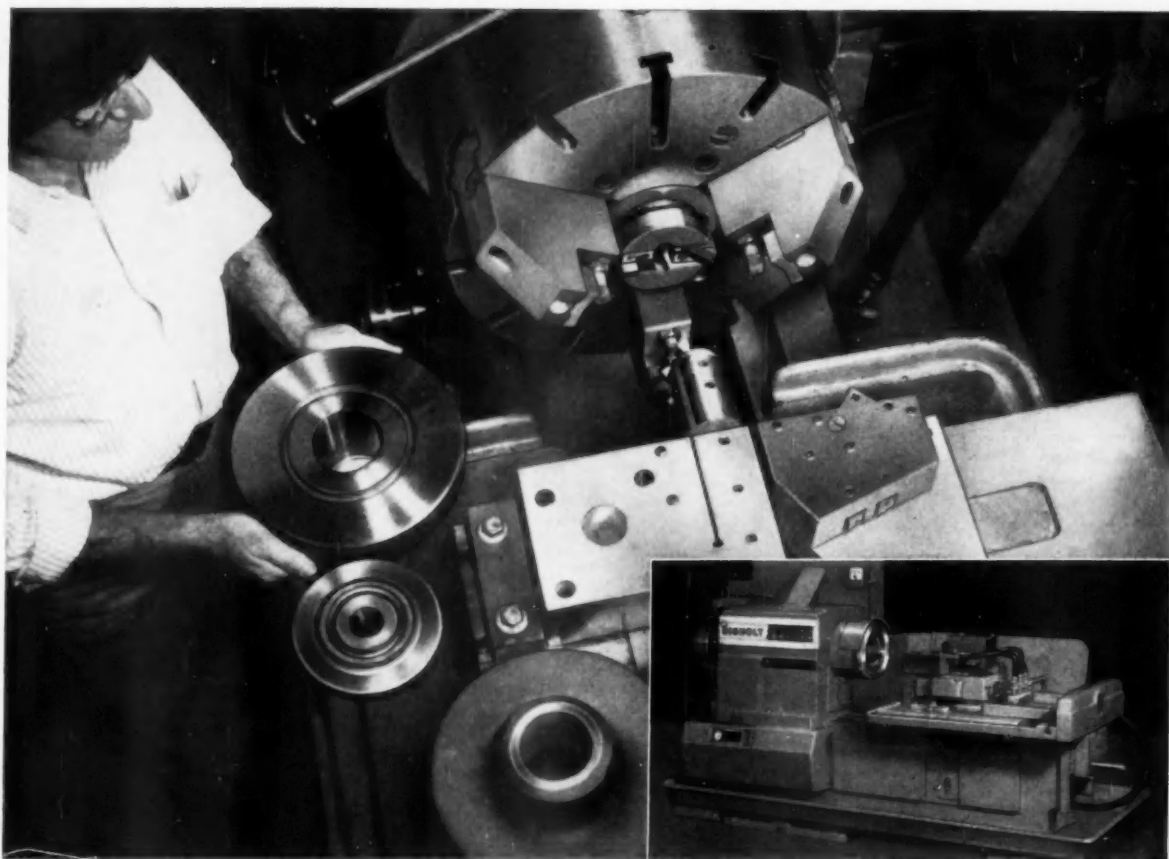
TIMING CHAINS AND SPROCKETS

LINK-BELT COMPANY: 220 South Belmont Ave.,
Indianapolis 6, Ind.

14,509



GREATER CAPACITY IN PIN BEARING AREA of Link-Belt's 1/2-in pitch chain permits use of a shorter width than conventional 3/4-in. pitch designs.



Smart planning on Simplimatic holds f.t.f. time to 1.7 min. on 6½" diam., 3.3 min. on 10¾" diam. workpieces.

How OTM Corp. cuts costs machining parts in 13 sizes

Handles each part in single chucking, using Simplimatic with back-facing attachments and two-speed motor

You may get ideas from the way OTM Corporation, Houston, Texas, machines steel welding neck flanges and welding necks—with each part in 13 different sizes—completing each part in a single chucking and holding change-over time to an absolute minimum.

Here's how the job is done on a Gisholt Simplimatic Automatic Lathe: Facing, grooving, boring and chamfering operations are performed from tools on short tool slides, with T-slotted tops for quick adjustment. Relieving the boring tool at the end of the cut eliminates tool tracks. Simultaneously, a special back-facing attachment works through the spindle to shave-face and chamfer the O.D. on the hub. A power chuck wrench operates the scroll chuck and permits mounting this attachment in the spindle bore. A two-speed motor

provides correct surface speed and permits switching from high speed (for turning and facing) to low speed (for grooving operation) and back again, during the Simplimatic's automatic machining cycle.

Here, again, the Gisholt MASTERLINE Simplimatic Automatic Lathe saves a manufacturer the cost of a special machine. Its extra wide platen table provides ample space for an infinite number of slide and tool arrangements—and its table feed permits tools to engage with the work or perform additional machining operations before actual slide movements begin. Ask your Gisholt Representative to show you how the Simplimatic performs special machine functions at standard machine prices—on your product and under your production conditions.



GISHOLT

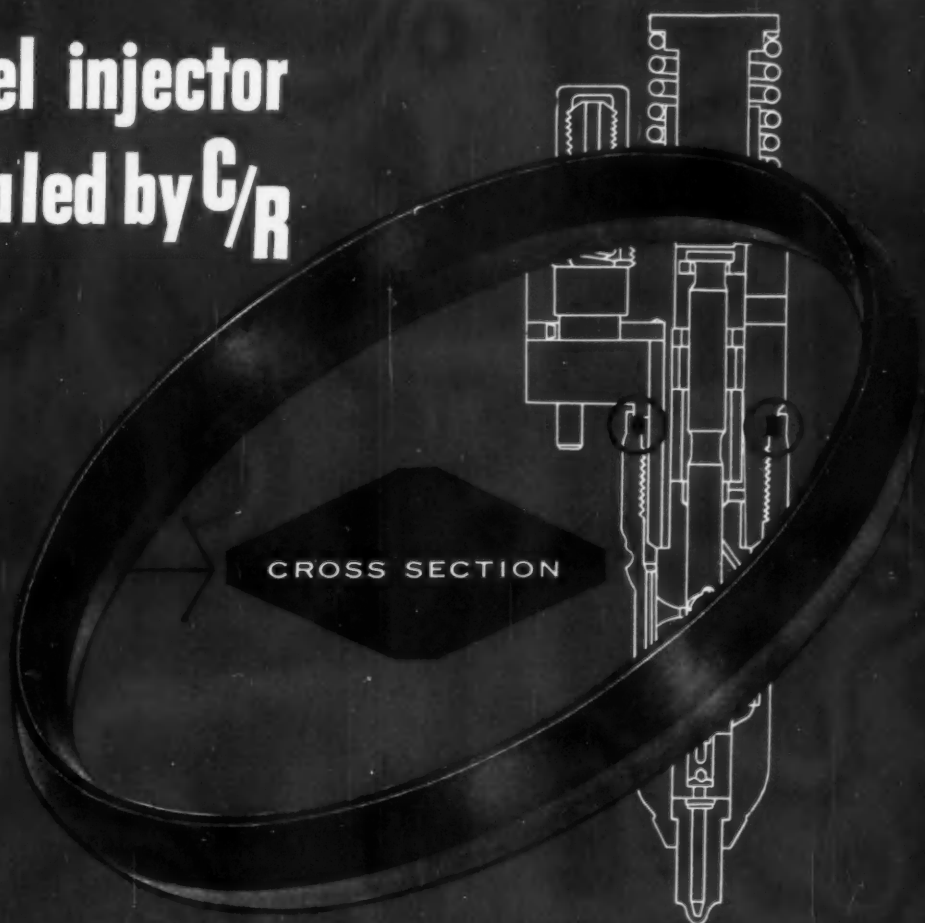
MACHINE COMPANY

Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for new Catalog 1159-A on Gisholt MASTERLINE Simplimatic Automatic Lathe. Shows 31 typical jobs—fully illustrated.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

Fuel injector sealed by C/R



ELIMINATES INJECTION NOZZLE LEAKS

Crankcase dilution can be a big headache. But not for one of the leading Diesel manufacturers. They knew that the right injection nozzle seal would cure a major cause . . . and came to C/R Sirvene engineers for help. C/R manufactured this Sirvene (synthetic rubber) part to extremely critical dimensions and physical properties to match the equally precise dimensions of the assembly. Result: no more leakage. When you need a pliable mechanical part compounded to meet critical specifications of heat, pressure, abrasion resistance and molded to the most exacting tolerances, you need C/R Sirvene. C. R. Sirvene engineers will gladly cooperate

with you in all phases of your sealing problem . . . from design, compounding of the correct oil-resistant elastomers, through laboratory-like control of production quantities. Write for your copy of the new booklet, "Sirvene."

CHICAGO RAWHIDE MANUFACTURING COMPANY

1205 Elston Avenue, Chicago 22, Illinois

Offices in 55 principal cities. See your telephone book.

In Canada: Manufactured and Distributed by Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario

Export Sales: Geon International Corp., Great Neck, New York



Other C/R Products

C/R Shaft and End Face Seals • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic Gears



Eddy-Current and Solving Problems

If you want to Drive, Stop, Test—Control Speed, Torque, or Tension — Dynamatic Equipment will do it Better at Lower Cost!

Dynamatic Eddy-Current Couplings, Drives, Brakes, and Dynamometers —

fulfill practically all stepless adjustable speed and testing equipment requirements, using standard alternating current as a power source. This Dynamatic torque transmitting equipment, with electronic or magnetic amplifier control, offers a long list of outstanding advantages: rapid response, wide speed range, quiet operation, low power loss, low maintenance cost, and remote control. There are types and sizes of Dynamatic Eddy-Current Equipment for every industrial requirement, including compact drive-package combinations (*illustrated at the right*).



Dyna-torQ Magnetic-Friction Clutches, Brakes, Clutch-Brakes, and Clutch-Couplings —

provide the accurate trouble-free method of controlling power and motion in modern stop-and-go machines. Eaton Dyna-torQ units utilize a simple operating principle which provides instant response, shockless acceleration and deceleration. Superior construction means long operating life, minimum down-time, low maintenance cost. Outstanding advantages include rapid engagement and disengagement, self adjustment, lower operating temperature through effective cooling, simple accurate control. There is a wide range of sizes and capacities.

*Send for Illustrated Literature Describing
Dynamatic Eddy-Current and Dyna-torQ Equipment*



PAPER



AUTOMOTIVE



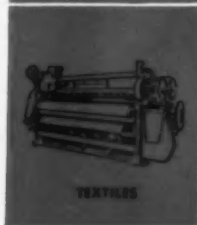
AIRCRAFT



MINING EQUIPMENT



CEMENT



TEXTILES



CHEMICALS



MATERIALS HANDLING



RUBBER

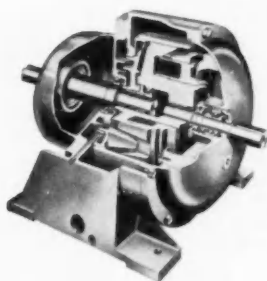


MACHINE TOOLS



PRINTING

Magnetic-Friction Equipment is in Every Major Industry

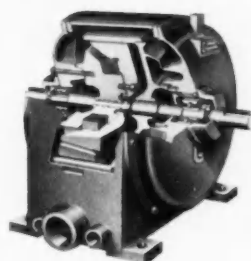
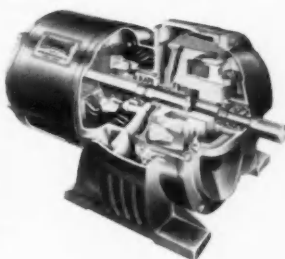


EDDY-CURRENT COUPLINGS

Dynatomic Eddy-Current Couplings transmit torque from driving to driven member without mechanical contact, shock, or friction. Controls provide infinitely adjustable speed from a constant speed source or constant speed from a variable speed source with smooth, controlled acceleration. Liquid-cooled and air-cooled types.

EDDY-CURRENT DRIVES

Dynatomic Eddy-Current Drives consist basically of an integral combination of an AC constant speed induction motor and an eddy-current coupling. Electronic or magnetic amplifier control provides accurate speed control for a wide range of applications. Available in liquid-cooled and air-cooled types.

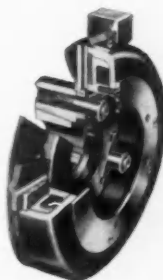
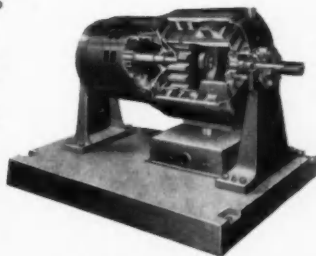


EDDY-CURRENT BRAKES

Dynatomic Eddy-Current Brakes are available in a wide range of torque capacities and operating speeds. Features include smooth, frictionless, shock-free operation with no rotating electrical components or contacts. Liquid-cooled and air-cooled types.

EDDY-CURRENT DYNAMOMETERS

Three types of Dynatomic Eddy-Current Dynamometers are available to meet various testing requirements; absorption dynamometers up to 15,000 HP; motoring or driving dynamometers up to 500 HP; and universal dynamometers to 500 HP and larger. Special purpose dynamometers are also available.

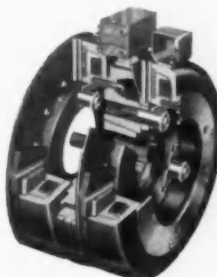
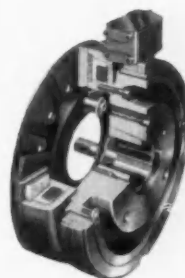


DYNA-TORQ BRAKES

Dyna-torQ Brakes provide controlled deceleration and positive stop with a touch of the control. Rapid, shockless stopping of rotating machine parts reduces interval between operations, and positive holding keeps them motionless between cycles. Compactness and remote control mounting conserve space.

DYNA-TORQ CLUTCHES

With the Dyna-torQ Clutch close control of clutch torque provides soft, cushioned starts, minimizing shock. Driving motors may be brought to operating speed before coupling to the load. Soft clutching permits controlled acceleration.

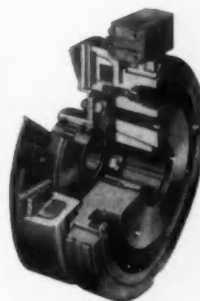


DYNA-TORQ CLUTCH-BRAKES

The Dyna-torQ Clutch-Brake provides closely controlled acceleration and deceleration. It is ideal for applications requiring automatic start-stop operation, eliminating time loss in slow-down between operations, and facilitating accurate automatic cycling.

DYNA-TORQ CLUTCH-COUPPLINGS

Compact, simple, Clutch-Coupling parts are installed on shaft ends in the same manner as the halves of a conventional flexible coupling. Designed for clutching of directly-aligned shafts, the Dyna-torQ Clutch-Coupling is easily installed on existing machinery or designed into new equipment.



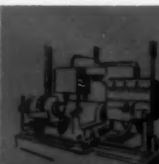
DYNAMATIC DIVISION
EATON MANUFACTURING
KENOSHA WISCONSIN



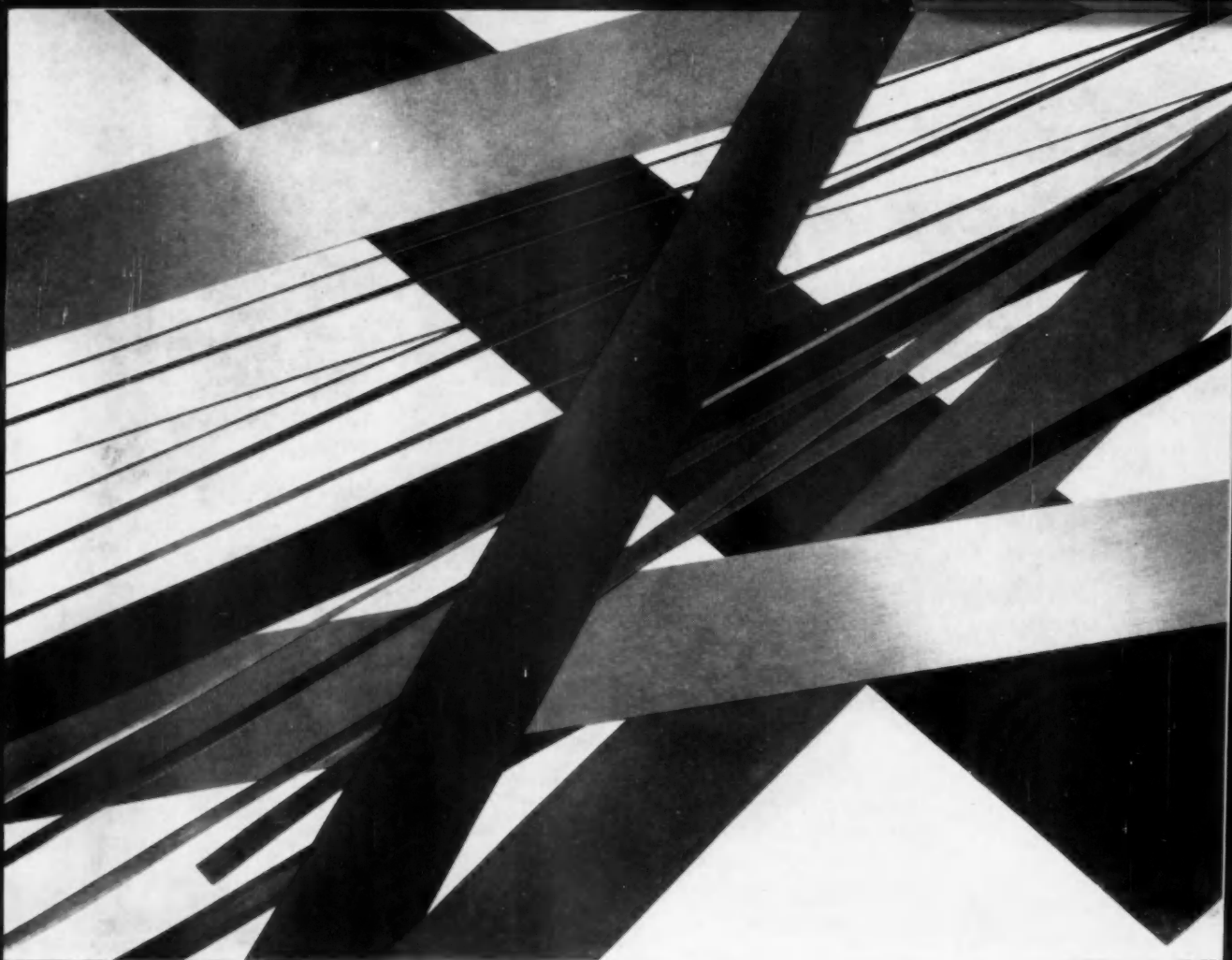

METALS



BUSINESS MACHINES



TESTING



How these "educated" steels make products behave better

● Nobody will deny that there can be a vast difference between steels that are supposedly alike. The difference lies in "tremendous trifles" that often make all the difference between smooth and erratic fabrication or between satisfactory and faulty product behavior.

That's why the steels shown above are "educated", you might say—educated for special use. Because here at the *Athenia Steel Division* of National-Standard we've concentrated for years on learning about and controlling

those tremendous trifles! In turn, this learning and experience is put right into the Athenia steels that successfully meet many of the toughest assignments known today.

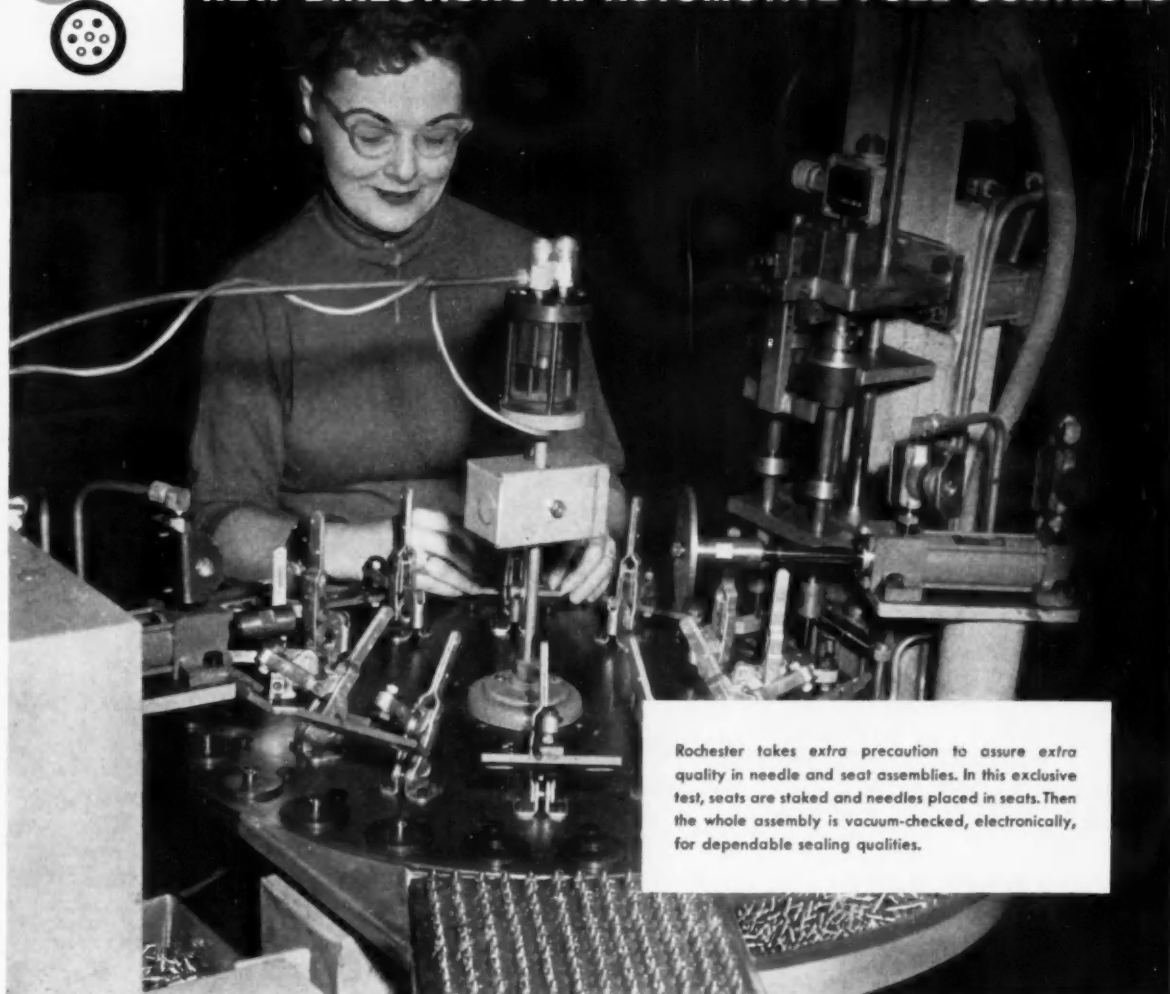
If your production calls for cold rolled flat steels of .45 carbon or higher, from .015" to 16" wide and from .001" to .065" thick, it would be a good idea to explore Athenia quality, performance and service.

NATIONAL STANDARD

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; tire wire, stainless, music spring and plated wires • WORCESTER WIRE WORKS, Worcester, Mass.; high and low carbon specialty wires
WAGNER LITHO MACHINERY, Secaucus, N. J.; metal decorating equipment • ATHENIA STEEL, Clifton, N. J.; flat, high carbon spring steels • REYNOLDS WIRE, Dixon, Ill.; industrial wire cloth



NEW DIRECTIONS IN AUTOMOTIVE FUEL CONTROLS



Rochester takes extra precaution to assure extra quality in needle and seat assemblies. In this exclusive test, seats are staked and needles placed in seats. Then the whole assembly is vacuum-checked, electronically, for dependable sealing qualities.

EXCLUSIVE ELECTRONIC TEST ASSURES PINPOINT ACCURACY IN EVERY ROCHESTER CARBURETOR!

original equipment
on over 20,000,000
fine cars and trucks

Before a Rochester Carburetor gets the "GO" sign . . . it must travel the industry's toughest course. Each carburetor is checked and double checked by Rochester's exclusive and exhaustive quality controls before it's ready for delivery. For example, in the Rochester-developed test above, all float valve assemblies are electronically checked to assure maximum sealing qualities between the needle and seat when a vacuum is applied to the system. This extra regard for precision and quality makes Rochester Carburetors the best way to drive home a powerful performance story to your customers.



ROCHESTER CARBURETORS

ROCHESTER PRODUCTS DIVISION OF GENERAL MOTORS, ROCHESTER, N. Y.



HELIARC Welding

breaks the light-gage metal barrier

Welding stainless steel sheet into a smooth, streamlined shape for jet plane fuel tanks is a production job for HELIARC Welding. This method, utilizing a tungsten electrode shielded by LINDE Argon, was developed by LINDE especially for use on hard-to-weld commercial metals.

HELIARC Welding can be used either automatically or manually, in all manual welding positions. LINDE Argon in bulk or in cylinders—99.99% pure—protects the weld. Since no flux is required, joints

are clean and smooth, without spatter, saving you time and money.

Get more information about HELIARC Welding. For a free copy of the booklet, "Modern Methods of Joining Metals," write Dept. H-23, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in other principal cities. In Canada: Linde Company, Division of Union Carbide Canada Limited.



Fuel tanks for jet planes, made of thin stainless steel, are quickly assembled with smooth, clean and sound seams by HELIARC Welding, a LINDE development.

FOR THE BEST IN ELECTRIC WELDING—LOOK TO LINDE!



The terms "Linde," "Heliarc," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.



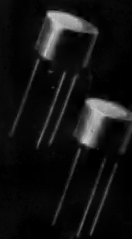
1958

Autronic-Eye Features...

driver-operated control



...transistors



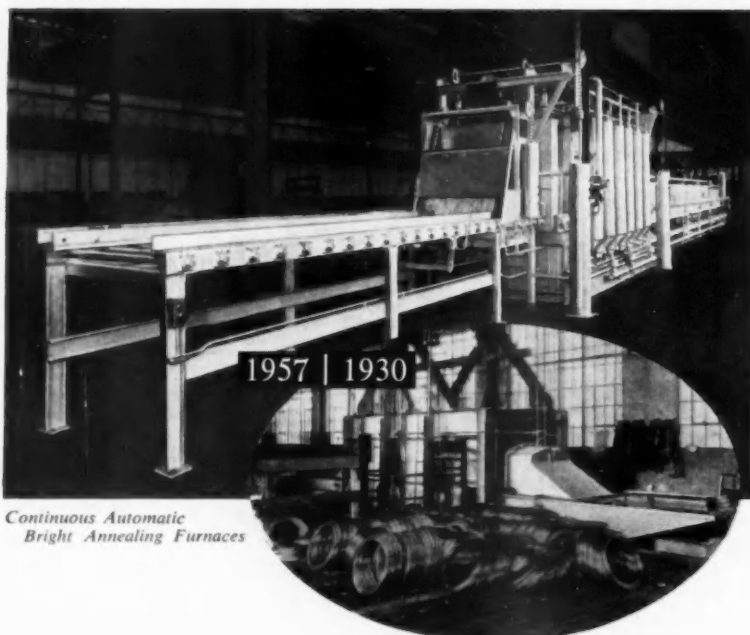
There's brand new sales appeal in Guide's new driver-controlled Autronic-Eye! And for General Motors Car Dealers, it means new profit potential. A new sensitivity adjustment allows the driver to control how soon the "Eye" dims his lights . . . makes it possible to adjust, on the spot, for varying highway situations. Use of transistor in the power amplifier enables it to operate with full effectiveness in all weather conditions. These new and easy-to-see benefits will produce results from the simplest demonstration. And the importance of automatic dimming, with the brighter four-headlamp systems, will make the 1958 Autronic-Eye easier than ever to sell!



Guide Lamp

... BRIGHTEST NAME IN LIGHTS

GUIDE LAMP DIVISION • GENERAL MOTORS CORPORATION • ANDERSON, INDIANA



Continuous Automatic
Bright Annealing Furnaces

Yesterday's Pioneers . . . Today's LEADERS

Almost 30 years ago, Holcroft was leading the way in the development and refinement of continuous automatic heat treating furnaces. The furnace shown in the oval, for example . . . an oil fired, muffle-type, steam atmosphere furnace for bright annealing copper wire . . . was built back in 1930 for a prominent Canadian wire and cable manufacturer.

Holcroft's position of leadership, well established then, remains unchallenged now . . . and Holcroft's present-day version of a continuous automatic bright annealing furnace (illustrated above) perhaps best explains why. For this modern furnace bright anneals brighter, cleaner, faster. It features radiant tube heating, controlled exothermic atmosphere, complete mechanical handling, a temperature regulated cooling tunnel . . . and it will handle 2,500 pounds of copper and brass tubing per hour, straight or coiled, in sizes from tiny capillary to 3" O.D. In a word, it's *all Holcroft*, and in a heat treat furnace there's nothing finer. You'll find that out for yourself when you make your next furnace a Holcroft.

HOLCROFT AND COMPANY



6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • HARTFORD, CONN. • HOUSTON, TEXAS • PHILA., PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

CALENDAR OF COMING SHOWS AND MEETINGS

- American Society for Quality Control, Middle Atlantic Conference, Hotel Statler, New York, N. Y. Feb. 28-Mar. 1
- ASME Gas Turbine Conference and Exhibit, Shoreham Hotel, Washington, D. C. Mar. 2-6
- Leipzig Spring Fair, Leipzig, Germany Mar. 2-11
- ASME Gas Turbine Power Div. Conference and Exhibit, Shoreham Hotel, Washington, D. C. Mar. 3-6
- SAE Passenger Car, Body and Materials Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. . . . Mar. 4-6
- Instrument Society of America, Pittsburgh Section Annual Conference on Instrumentation for Iron and Steel Industry, Roosevelt Hotel, Pittsburgh, Pa. . . . Mar. 11-13
- Pressed Metal Institute, 1958 Spring Technical Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. . . . Mar. 12-14
- Geneva Automobile Show Mar. 13-23
- Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago, Ill. Mar. 17-18
- ASME Aviation Division Conference, Hotel Statler-Hilton, Dallas, Tex. Mar. 17-20
- International Atomic Exposition, Inc., International Amphitheatre, Chicago, Ill. Mar. 17-21
- ASME Committee on Management Conference, Hotel Somerset, Boston, Mass. Mar. 19-20
- SAE Production Meeting and Forum, Drake Hotel, Chicago, Ill. Mar. 31-Apr. 2
- International Automobile Show, N. Y. Coliseum, New York, N. Y. Apr. 5-13
- SAE Aeronautic Production Forum and Aircraft Engineering Display, Hotel Commodore, New York, N. Y. Apr. 8-11
- Design Engineering Conference, International Amphitheatre, Chicago, Ill. Apr. 14-17
- American Welding Society Show and annual technical meeting, Kiel Auditorium and Hotel Statler, St. Louis, Mo. . . . Apr. 14-18
- Institute of Environmental Engineers, second annual meeting, Hotel New Yorker, New York, N. Y. Apr. 17-18
- American Society of Tool Engineers, annual meeting and tool show, Convention Hall, Philadelphia, Pa. May 1-8
- American Society for Metals, Southwest Metal Exposition and Congress, Dallas, Tex. . . . May 12-16
- National Truck, Trailer and Equipment Show, Great Western Exhibit Building, Los Angeles, Calif. May 15-18
- American Foundrymen's Society, 1958 Foundry Show, Cleveland Public Auditorium, Cleveland, O. May 19-23

If it moves...

Timken-Detroit Brakes can stop it!

...farm equipment
...special duty utility trailers
...lightweight highway trailers
...industrial machinery



"DM" DUPLEX MECHANICAL BRAKE

Best on many jobs. It has proved its worth with farm equipment, special duty utility trailers, light duty highway trailers, industrial machinery, and in a wide variety of special applications.

Greater torque output! The DM Brake is a self-energizing, balanced type . . . the two identical shoes do an equal amount of work in either forward or reverse direction.

Simpler Maintenance and Adjustment! The DM Brake is wedge-actuated through an easily accessible operating lever, giving positive braking with immediate response. It can be actuated by either an air or hydraulic cylinder, or mechanical means. Complete accessibility for quick, easy adjustment. Simple design keeps maintenance and service at a minimum.

Another Product of...



For every industrial, agricultural or automotive application where braking is required!



**Rockwell Spring
and Axle Co.**

BRAKE DIVISION
Ashtabula, Ohio

VISION



LOOKING TO THE FUTURE—PRODUCING FOR TODAY!

Progress has been the keynote of the automotive industry. Today's achievements are but challenges for the accomplishments of tomorrow.

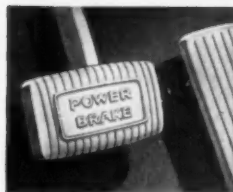
Over the years Bendix Products Division has contributed significantly to automotive progress. From four wheel brakes to power braking and power steering, Bendix has pioneered and developed many of the industry's most notable advancements.

And today Bendix Products Division is planning new and better products for the cars and trucks of tomorrow.

That's why the industry looks to Bendix* as a source of new ideas, as well as a volume manufacturer of automotive components.

*REG. U.S. PAT. OFF.

TYPICAL EXAMPLES



Bendix Power Brakes



Bendix Power Steering

**BRAKES • POWER STEERING • POWER BRAKING
CONSTANT VELOCITY UNIVERSAL JOINTS • HYDRAULIC REMOTE CONTROLS**

Bendix PRODUCTS
DIVISION **South Bend, IND.**



AUTOMOTIVE INDUSTRIES

BUSINESS DEPARTMENT

John C. Hildreth, Jr., Publisher
John F. Pfeffer, Asst. to Publisher
E. H. Miller, Advertising Mgr.
E. W. Hevner, Circulation Mgr.
James Cadagan, Asst. Circulation Mgr.

REGIONAL MANAGERS

CHICAGO—William H. Baldwin
—Carl A. Zehner
360 North Michigan Ave.
Chicago 1, Ill.
Phone RAndolph 6-2144

DETROIT—Melvin B. Nylund
103 Pallister Ave.
Detroit 2, Mich.
Phone TRinity 3-7800

PHILADELPHIA and NEW YORK—
Nelson W. Sieber
Chestnut and 56th Sts.
Philadelphia 39, Pa.
Phone SHerwood 8-2000
and
100 East 42nd St.
New York 17, N. Y.
Phone OXford 7-3400

NEW YORK—Robert P. Hulbert
100 East 42nd St.
New York 17, N. Y.
Phone OXford 7-3400

CLEVELAND—Richard P. Keine
930 B. F. Keith Bldg.
Cleveland 15, Ohio
Phone SUperior 1-2860

DALLAS—William J. Smyth
909 Mercantile Securities Bldg.
Dallas 1, Tex.
Phone RIverside 7-1732

TULSA—John W. Sangston
621 Petroleum Bldg.
Tulsa, Okla.
Phone LUther 4-1789

SAN FRANCISCO—Frank W. McKenzie
1355 Market St.
San Francisco 3, Calif.
Phone UNderhill 1-9737

LOS ANGELES—L. H. Jackson
198 S. Alvarado St.
Los Angeles 57, Calif.
Phone DUmkirk 7-4337

One of the Publications
Owned by

CHILTON COMPANY

Executive Offices
Chestnut & 56th Sts.
Philadelphia 39, Pa., U.S.A.

Officers and Directors

JOSEPH S. HILDRETH, Chairman of Board
G. C. BUZBY, President

Vice Presidents

P. M. FAHRENDORF L. V. ROWLANDS
HARRY V. DUFFY GEORGE T. HOOK

ROBERT E. MCKENNA

Treasurer—WILLIAM H. VALLAR

Secretary—JOHN BLAIR MOFFETT

MAURICE E. COX FRANK P. TIGHE

EVERIT B. TERHUNE, JR.

JOHN C. HILDRETH, JR.

RUSSELL W. CASE, JR.

STANLEY APPLBY—Comptroller

High Spots of This Issue

Air Springs for Passenger Cars

This article describes Buick, Ford, Chevrolet, Oldsmobile, and Rambler air suspension systems. Part I covers the overall layouts of the systems and air springs; Part II, which will appear in an early issue, discusses leveling valves, auxiliary components, and compressors. Page 50.

Rising Volume of Car and Truck Rentals

Car and truck rental and leasing companies are an important part of the new motor vehicle and equipment market. This timely survey gives the latest facts and figures on this booming industry and discusses factors influencing its growth. Page 58.

National Motor Boat Show

New engines and accessories are highlighted in this report on the 48th National Motor Boat Show. Among the items covered are a new Diesel outboard, inboard V-type engines, and outboard engines with 50 to 70 hp ratings. Page 60.

Huge Expansion Ahead

AUTOMOTIVE INDUSTRIES' Detroit correspondent examines the automobile market and predicts a huge expansion in the next few years. He bases his conclusions on such factors as increasing population and new superhighways. Page 69.

Retarder Systems for Heavy Vehicles

European manufacturers and users of heavy vehicles are taking a close look at additional braking systems as a means of cutting down on highway accidents. Electric, hydraulic, and exhaust brake systems now in use are surveyed here. Page 70.

40 New Product Items

And Other High Spots, Such As

Assembling Lincoln and Continentals; Spicer transmission; Cadillac's Plant 4; automotive uses for plastics; high-efficiency painting equipment; and industry statistics.

AUTOMOTIVE INDUSTRIES COVERS—
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

How to avoid the Purchasing-Production Squeeze

Control of inventory costs is going to be more important than ever during the coming months.

Production, as always, will want to be sure there's enough of the right materials to keep production rolling.

Management will, of course, want to keep investment in inventories under careful control.

This two-sided responsibility makes more difficult the job of buying in the most economical quantities to meet projected requirements.

There's a good way out when it comes to steel: Ryerson immediate service.

With Ryerson carrying your steel inventory, you eliminate the risk of over-

buying, minimize the cost of possession, yet assure your machines all the steel the schedule calls for. You can draw on Ryerson stocks for the kind of steel you want, in the quantities you want, and get it exactly when you want it.

You gain complete flexibility of steel supply without long-term commitments. Should production call for a change in the kind of steel needed, you won't be caught with large stocks you cannot use. Ryerson carries the nation's largest stocks . . . is known for fast, dependable delivery . . . can help you combine orders for still lower costs.

A phone call to Ryerson is the first step in tightening steel inventory control and reducing your over-all steel costs.



RYERSON STEEL

Member of the  Steel Family

Principal Products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing—aluminum industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE
CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS
LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 118, No. 4

February 15, 1958

Big Three Engineers Push Small Car Plans

Big Three automobile manufacturers are eyeing the growing small car market with the idea of coping healthy percentages of sales with domestic rather than imported cars.

At General Motors and Ford Motor Company, it's the low-priced members—Chevrolet and Ford—who are planning the short wheelbase models. At Chrysler Corp., it appears to be more of a "family" project, since the Export Div. has a keen interest in the outcome. Export would like to have a smaller car to sell overseas.

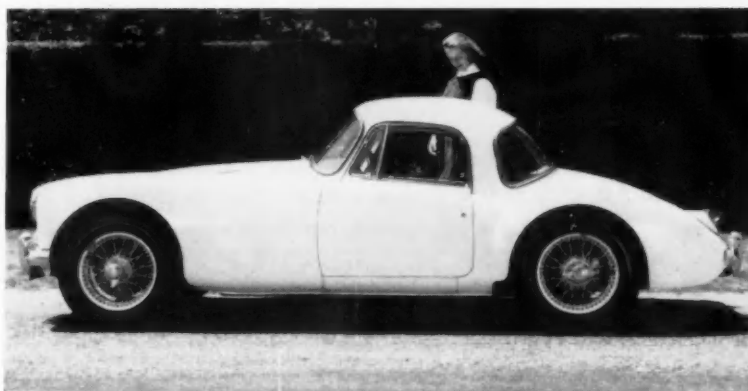
Ford Div. apparently has moved its program out of styling and into engineering, where a 70-hour work week is not unheard of. Ford's thinking is to design and build a car that will not have the "foreign" imprint. In other words, a true-blue American car.

It's conceivable that the small Ford will be powered by a new four-cylinder overhead valve engine with horsepower rating of 60-70. But the six-cylinder possibility is not being overlooked. The American small Ford should have more engine capacity, it is felt, than the imported cars.

A single, two-door model probably will be the final package. Bolt-on front end construction is a distinct possibility.

Chevrolet's program is proceeding along similar lines. Both Chevrolet and Ford in recent years have edged up into the middle-price bracket with the Bel Aire and the Fairlane 500. Now the idea is to move in the other direction.

Although Ford reportedly is working with wheelbases ranging from 102 in. to 106 in., both Ford and Chevrolet could end up with 99 in. wheelbase models.



1958 MG COUPE PERFORMS LIKE A SPORTS CAR

The 1958 MG A-Type two-passenger coupe is similar mechanically to the MG roadster. It is powered by a four-cylinder overhead valve engine that develops 72 hp at 5500 rpm. It has an overall height of 50 in., and overall length of 156 in. It is being sold and serviced by more than 500 distributors and dealers in the U.S., and is offered in the \$2600 price range.

The Chrysler program is working along similar lines, with the idea of building a completely new car. Chrysler's thinking, however, ultimately will be influenced somewhat by its final overseas manufacturing arrangements.

It does not seem likely, at this time, that any of the small American cars will be marketed before 1961 model year.

Dodge Adds Economy Model To Meet Growing Demand

Dodge Div. has added a new six-cylinder model to its 1958 passenger car line to meet a growing demand for economy models. The new Coronet two-door Lancer hardtop has Powerflite push-button automatic transmission as standard equipment, a concession to the trend to automatic shift.

Dodge also is making power steering available on all of its Coronet six-cylinder models.

The division announced that its new six-cylinder model was introduced to meet demand in the eastern states and the metropolitan areas of Chicago, Cleveland, Detroit.

Westinghouse Sales in '57 Establish a New Record

Net earnings of the Westinghouse Electric Corp. for 1957 jumped to \$72,652,000 from the preceding year's \$3,492,000, according to a report by Gwylm A. Price, board chairman.

Net sales for 1957 were \$2,009,043,000, a new high; and for the fourth quarter were \$531,770,000, a record for any quarter. Included in earnings for the final quarter, the company said, was \$4,240,000 of Federal taxes paid in previous years that was refunded by the Government in 1957.

Mr. Price said that orders entered in 1957 were the highest recorded by Westinghouse in any year, and that backlogs at the year-end were at high levels.



MACK INTRODUCES NEW CAB-FORWARD TRUCK

Versatile new cab-forward truck built by Mack Truck, Inc., is adaptable both for light and heavy hauling in the city or over the road. The new models will be produced for use either as four or six wheel trucks or tractors, and will be available with either gasoline or Diesel engines, and a range of transmissions covering 5, 10, 15 and 20 speeds. All models are equipped with a spring balance arrangement which allows the entire cab to be tilted forward and returned to position by a touch of the hand.

Simca Expects U.S. Sales Of 14,000 Units in 1958

Simca, Inc. expects U. S. sales of French-made Simca automobiles will be limited only by factory availability during 1958 and therefore will be held to 14,000 units.

Simca sales in this country jumped from 2000 in 1956 to 12,000 last year. A. M. Dolza, president of Simca, Inc. says his distribution firm will be able to sell all the cars it can get this year.

Main seller in the U. S. is the Aronde, a 4-cylinder, 52 hp car.

Thunderbird to Bring Out New Soft-Top Convertible

The new four-passenger Ford Thunderbird will have a soft-top convertible version available later this year. The hideaway top convertible will push the Thunderbird even farther into the luxury class and farther away from its one-time rival, the Corvette.

The new T-Bird will conceal its top in the trunk, leaving full space in the rear seat and maintaining the styling lines of the car. Price probably will be above \$4,500.

This will leave Corvette alone in a price class formerly occupied by

both Corvette and Thunderbird. Corvette currently carries a suggested list price of \$3,335, while the discontinued two-passenger Thunderbird had a 1957 suggested list price of \$3,123.

Corvette consequently has increased its current production schedules by 30 per cent to take advantage of its unique market position.

But Ford is not worried—two weeks before public announcement of its new four-passenger T-Bird, the factory had received more than 3000

orders. According to Ford, this represents a full two months' orders of the old model Thunderbird.

Through January, Ford had built 1676 Thunderbirds.

AMC Shows First Quarter Rise In Both Sales and Earnings

American Motors registered increases in both sales and earnings during the first quarter of the current fiscal year. Sales of \$118,598,502 were 33 per cent above last year's total of \$88,903,414.

The company reported a profit of \$4,948,736 during the three months ended last Dec. 31, compared with a loss of \$2,994,613 during the corresponding period a year ago.

AMC expects to show a "substantial" profit for the full year.

Retail sales of AMC cars totaled 35,668 units, compared with 26,327 a year ago, and production totaled 41,492 cars compared with 28,021.

AMC says its production schedules for the current quarter (January-March) are higher than in the last period.

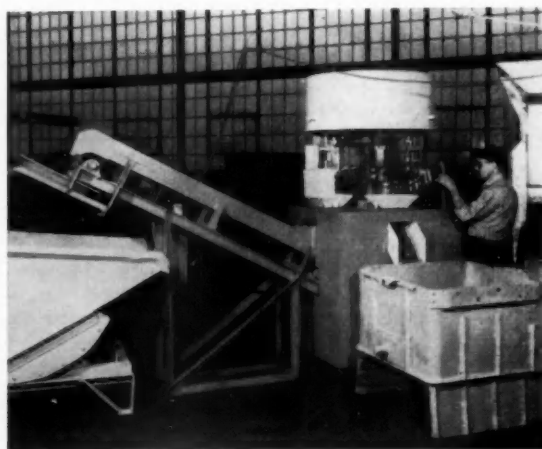
Chevrolet Produces 9 Millionth Truck

Chevrolet Motor Div. this month produced its 9 millionth truck since its first commercial vehicle was built in 1918. Now the largest builder of trucks, Chevrolet boasts that 40 per cent of its total production, or about 3.6 million trucks, is still in use, and that 80 per cent of all trucks on the road today are Chevrolets.

Last year, Chevrolet built 351,739 trucks. Chevrolet now has 134 truck models, with more models probably in the works for introduction in the near future.

SONIC TESTING MACHINE

Sonic testing machine was developed by engineers at Central Foundry Div. of General Motors to check soundness of castings produced by the division. A small ball strikes the casting and sets up sound waves, which are picked up by a microphone and sent through electronic equipment. The casting is automatically passed or rejected according to pitch of its sound.



Ford Plans to Boost Imports Of English Cars During 1958

Ford Motor Company plans to boost imports of its English-made automobiles by nearly 50 per cent during 1958 to between 35,000 and 40,000 units.

During the past year 23,000 English Fords were brought into this country by the Ford International Div. The franchised dealer group handling the cars increased in size from 300 to 400 during 1957.

Ford's new M-E-L Div., however, has been handed the responsibility of marketing the English cars in the U. S. A more active franchising program is expected, with additional Mercury, Edsel and Lincoln dealers getting the foreign car sales rights.

Planned for 1958 introduction is a new Thames estate wagon, a nine-passenger version of the Thames van. The M-E-L Div. may begin marketing Ford's German-built Taunus later in 1958, although no plans have been announced.

The Ford plant in Dagenham, England, currently is building 1600 to 1700 cars a day, but a two-year expansion program calls for eventual output of 2000 units daily. English Ford production for 1957 totaled 343,000 cars, vans and tractors, of which 184,000 were exported.

Studebaker-Packard Selling Globe-Union Batteries

Studebaker-Packard dealers are handling a new line of Globe automobile batteries under an exclusive agreement that makes S-P's Parts and Accessories Div. national distributor for the batteries.

S-P's 21 parts depots are warehousing and distributing the new line of batteries. Globe-Union has developed four basic battery sizes to replace the former 21 sizes required to fill all needs, thus requiring a smaller dealer inventory.

Paradynamics Buys Controlling Interest in Four Wheel Drive

Paradynamics, Inc., a St. Louis research and development firm, has purchased controlling interest in Four Wheel Drive Auto Co. Paradynamics bought 151,000 shares of FWD stock from a Chicago investment group.

President of the St. Louis firm George E. Mallinckrodt succeeds Franklin Lyons as board chairman of the commercial vehicle manufacturing company. No managerial changes were planned.



PLYMOUTH ADDS NEW STATION WAGON TO LINE

A new four-door, six passenger Deluxe Suburban station wagon has been added to Plymouth's 1958 line. This brings to 14 the number of station wagons offered by Plymouth this year, including two-door, four-door, V-8, and six-cylinder options.

Firestone Develops New Tire To Eliminate Upright Spare

A "spare tire" that can't go flat and takes less than one third the trunk space of a conventional tire has been developed by Firestone Tire & Rubber Co.

Called Perma Spare, the new tire is a thin steel disk with a smooth, two-inch solid rubber tread. The company says it is easy to handle and install, and can carry a motorist 100 miles for permanent repairs to a punctured tire.

Perma Spare can be installed simply by jacking the damaged tire off the pavement, removing the hub cap, and attaching the spare, with the wheel bolts, to the outside of the damaged tire.

Firestone officials said that the new tire is now being tested by major automobile manufacturers.

Ford of Canada Forms Single Sales Division

All car and truck merchandising activities of Ford Motor Co. of Canada in the Canadian market will be concentrated within a single sales division headed by George H. Jackson, vice-president of sales and advertising.

T. J. Emmert, executive vice-president, emphasized that consolidation

of the Ford-Edsel and Mercury-Lincoln-Meteor Divs. into one division is purely a matter of internal organization. It leaves unaffected the company's contract lines and the existing separate dealer organizations. Dealers will continue to sell the same line of cars and trucks as at present.

Twin Coach Anticipates Profit After \$2.85 Million Loss

Twin Coach Co. expects to show a profit in 1958 although 1957 figures reveal a loss of \$2.85 million.

Company president William H. Coleman said the major sources of loss within the company have now been eliminated. Twin Coach recently sold its sheet metal division and Fageol Products Co. marine engine division, both of which registered "substantial" losses in 1956 and 1957.

Twin Coach's sales in 1957 totaled approximately \$28 million, compared with \$24 million in 1956. Operating loss last year amounted to about \$850,000, while non-recurring losses on the sale of assets and revaluation of inventories accounted for the remaining \$2 million.

Confidence is based on the consistent profits of the remaining divisions, a \$38 million backlog of orders at the Buffalo aircraft division, and additional aircraft contracts under negotiation.

JAPANESE CAR

The Datsun, a four-passenger sedan, is built by Nissan Motor Co., Yokohama, Japan. It is mounted on an 87-in. wheelbase and powered by a 25 hp engine. Company is reported to be readying a new model for introduction to the American market.





TRAILER TO TRANSPORT NAVY POLARIS MISSILE

This huge trailer device, called a trans-erector, will be used to transport missiles and to position them on the launching pad. Built by Locomotion Engineering, Inc., for the Navy Polaris missile program, the vehicle is about 60 ft long, 9 ft wide, 8½ ft high, and weighs around 54,000 lb. It travels in a horizontal position, but can be raised to the vertical to place a missile on the launching pad. The trailer was delivered ahead of schedule to Lockheed Missile Systems Div.

China's Automotive Industry May Make Bid for British Aid

Communist China's infant motor vehicle industry is considering the possibility of technical and material help from British automobile and machine tool manufacturers.

This was stated by Mr. Kuo Li, a member of the 20-man Chinese technical mission that recently toured British industrial centers. Mr. Kuo is deputy director and chief engineer of the Changchun Automobile Factory in Red China.

On the question of outside assistance, Mr. Kuo explained that "we need international cooperation and interflow in a wide range not only in the exchange of technique and experi-

ence, but also in the supply of necessary materials."

Mr. Kuo reported that "during this visit I have made a preliminary study of the form and possibility of manufacturing British vehicles under license."

The Changchun factory, China's first motor vehicle plant, now has an annual output of 30,000 four-ton trucks. The model in production is a copy of the Russian ZIL-150, powered by a 338-cu in. six-cylinder engine of side-valve construction. A new and improved model is now being designed, Mr. Kuo said. He also reported progress with a six-passenger car.

The Changchun plant was designed and built by the USSR, which supplied all the machinery as well as

tooling and know-how. Some 180 Russian engineers and technicians supervised construction and plant installation. At the same time, a cadre of 800 Chinese engineers and administrators spent six months at the ZIL factory in Moscow for training.

Several British manufacturers are understood to be ready to play a similar role in the development of China's automobile industry. It is reported that some of them are already prepared to receive Chinese trainees in their factories, and to send their own technical advisors to China.

Continental Motors Doubles Its Earnings in Fiscal 1957

Continental Motors Corp. more than doubled its earnings during the 1957 fiscal year while sales rose 8 per cent during the 12 months ended last Oct. 31. Earnings jumped from \$1,604,924 the previous year to \$3,583,301 in 1957, while sales climbed from \$125,116,269 to \$135,610,890.

Continental attributed its 1957 increase to greater activity in public works jobs and the company's success in "broadening its customer base."

Merger of Wayne Works, Divco Paid Off With Gains in 1957

The merger of Wayne Works, Inc. and Divco Corp. at the end of 1956 paid off with increased earnings, sales and net worth for the new Divco-Wayne Corp. during 1957.

In the 1957 fiscal year, sales amounted to \$28,154,015 and earnings totaled \$1,140,695. In the previous fiscal year, Divco Corp. earnings amounted to \$443,978.

Divco Corp. purchased Wayne Works for \$1,310,000 cash and 200,000 shares of common stock. Net worth of the new firm is now \$8,145,858.

Sales, Profits at Aeroquip Decline in First Quarter

Sales and profits at Aeroquip Corp. declined during the quarter ended Dec. 31, first period of the company's current fiscal year.

Sales slipped slightly from \$8,997,169 a year ago to \$8,826,395. But earnings fell from \$494,094 to \$114,091.

Aeroquip cited as reasons for its own decline: a general decline in business activity, added costs of developing and introducing new products, and high overhead.



ARMY SATELLITE

Missile technicians at the Army Ballistic Missile Agency are shown assembling the Army satellite and final stage rocket. Both components are designed to orbit as a single unit.

Opel Imports on Schedule; Ships 1000 Cars a Month

Buick Motor Div. reports that imports of the German Opel are right on schedule—1000 units a month. Through the end of 1957, 4005 cars had been shipped from the factory, with another 1000 scheduled for January sailings.

Buick dealers delivered 1660 Opels, mostly on the East Coast, through Jan. 20.

Auto-Lite Ending Production At Its Lockland, O., Plant

Electric Auto-Lite Co. announced that it is ending production at its Lockland, O. plant near Cincinnati.

The plant at one time employed 3500 persons, but the work force has since been cut to 653. It produced automobile headlamps, tail and parking lamps, windshield wipers, electric window lifts, and other parts.

The company last March sold the plant to General Electric Co.

Pontiac Importing Vauxhalls At Rate of 1500 Per Month

Pontiac Div. began in February to import the English-built Vauxhall Victor at the rate of 1500 cars a month. Since introduction last September, the cars had been coming in at the rate of 500 a month, and by mid-January, 1600 retail deliveries had been made. Pontiac's original goal was to import 1000 Vauxhalls a month in the first year.

AT TABLOID AT

Aerojet-General Corp. and Stauffer Chemical Co. have announced a joint research and development program aimed at producing boron high-energy fuels for rockets and missiles.

* * *

Atomic Energy Commission is negotiating study contracts with Curtiss-Wright, General Electric, and a team consisting of General Motors and Nuclear Development Corp. of America. Purpose of study: to choose a mobile nuclear reactor system for military use.

* * *

Jones & Laughlin Steel Corp. purchased 300 acres and leased an additional 1720 acres in Iron and Ashland Counties, Wis., as part of its iron ore reserve program.

* * *

Molded Fibre Glass Co. has purchased equipment and inventories of Fiberglass Reinforced Plastic Molding Div. of American Hard Rubber Co., and will also take over production of fiberglass reinforced plastic parts formerly custom molded by American Hard Rubber.

* * *

Parts Div. of Dana Corp. moved to a new office and warehouse building at 253 Wagoner Blvd., Toledo, O., and will operate as a self-contained division.

* * *

U. S. blast furnaces produced a record 79,339,671 net tons of pig iron and ferroalloys in 1957, up 1.5 million tons over the previous high set in 1955, according to American Iron and Steel Institute.

* * *

American Brake Shoe Co. purchased Gaines Foundry, Inc., producers of aluminum and magnesium castings for the aircraft industry. The newly acquired facility will be operated as the Gaines Works of the Light Metals Dept. of Brake Shoe.

* * *

Sales of investment castings to non-defense industries should reach an all-time high of more than \$19 million in 1958, according to Vincent S. Lazzara, president of Casting Engineers, Inc. Up to now, about 90 per cent of all investment castings produced (\$110 million in 1957) were sold to defense industries.

American Zinc Institute reports that the zinc and lead industry will embark on a program to sponsor and stimulate zinc and lead research development projects in research centers, universities, and engineering schools. Both foreign and domestic producers will help finance and supervise the program.

* * *

Bendix-Westinghouse Automotive Air Brake Co. is holding a series of nationwide meetings for truck operators to discuss air brake equipment and how proper testing and preventive maintenance can contribute to greater braking safety. For more information, write to Bendix-Westinghouse, Elyria, O.

* * *

U. S. Industrial Chemicals Co. has begun construction at Cincinnati, O., of a pilot plant to produce tantalum and columbium metals. Primary market for tantalum is expected to be the chemical process industries; columbium has been in demand as an alloying material for steel, but its unique combination of properties point to its use in nuclear applications as well as in supersonic aircraft.

* * *

National Malleable and Steel Castings Co. has taken steps to broaden its business into the non-ferrous field by acquiring Grand Rapids Plating Co. and its subsidiary, Grand Rapids Die Casting Co.

* * *

L.O.F. Glass Fiber Co. is constructing a 100,000 sq ft plant in Corona, Calif. to manufacture its complete line of insulation products.

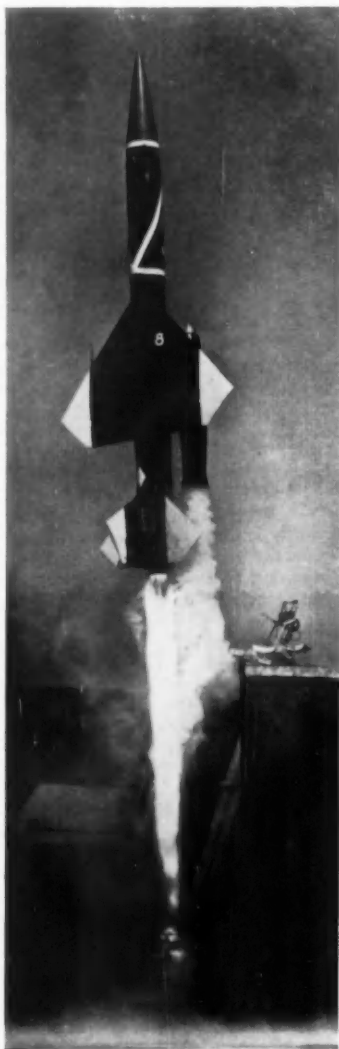
* * *

A merger agreement between Standard Tube Co. and Michigan Steel Tube Products Co., both of Detroit, Mich., has been approved by stockholders of both firms. The new company will operate under the Standard Tube Co. name.

* * *

Grants totaling nearly \$1,150,000 have been awarded to 135 universities and colleges in Du Pont's annual program of aid to education. More than half of the money will be spent to support the teaching of science and mathematics.

AVIATION MANUFACTURING



Bomarc IM-99 hurtles skyward in recent test firing at Cape Canaveral, Fla. Missiles can be equipped with nuclear warheads and can be fired in salvos and directed at individual targets.

Boeing Receives AF Contract For 100 More Bomarc Missiles

Boeing Airplane Co. has received an Air Force production letter contract to produce approximately 100 Bomarc IM-99 area defense missiles and supporting ground equipment.

The new order is the second for tactical models of the rocket-and-ram-



NEW MARTIN SEAMASTER UNDERGOING FLIGHT TESTING

The Navy's new 600-mph P6M Martin SeaMaster is capable of high speeds at low altitudes in order to perform its minelaying or photo-reconnaissance missions. Plane can refuel from a submarine and deliver mines or nuclear weapons against any target 2000 miles away. It has a gross weight of 160,000 lb and carries a crew of four.

Martin Begins Flight Tests Of Redesigned SeaMaster

Martin Co. has resumed flight testing of the P6M SeaMaster after a delay of over a year caused by loss of two prototype XP6M-1 planes. The test flight was made by the first of six "evaluation" YP6M-1 SeaMasters, which will be powered by four Allison

J-71 turbojet engines with take-off afterburners. Eighteen additional P6M-2 production seaplanes, also under construction, will be powered by four Pratt & Whitney J-75 turbojet engines.

Martin officials said that the new SeaMasters incorporate a redesign of the hydraulic control system, as well as several other design modifications.

jet propelled missile. Last August, the Air Force authorized approximately \$139 million of 1957 fiscal funds for an undisclosed number of Bomarcs and supporting equipment.

At the same time, the company revealed that it is using magnesium-thorium alloys developed by Dow Chemical Co. to reduce the Bomarc's weight and enable it to withstand the temperatures created by its 2000-mph-range air speed.

Magnesium-thorium sheet, according to Boeing engineers, forms 46 per cent of the upper wing surface and 32 per cent of the lower wing surface; the entire upper and lower elevator skins and doublers; upper and lower skins of elevator stubs; and fin and rudder skins and doublers.

Magnesium-thorium sheet also forms the aft section of the body monocoque, replacing a thin-steel skin and multi-stiffener structure originally designed.

Magnesium-thorium extrusions are used for leading and trailing edges of all Bomarc control surfaces, and several magnesium thorium sand castings were designed into the airframe, Boeing reports.

Allison Completes Test Of New Prop-Jet Engines

Allison Div. of General Motors has completed a 1000-hour flight endurance test of the Allison 501-D13 prop-jet engines and Aeroproducts 606 turbo-propellers which will be used

on the Lockheed Electra.

During the 84-day test period, a Convair YC-13-1C powered by the new equipment touched down in 50 cities in 24 states. Only routine line maintenance was performed on engines and propellers throughout the program, according to Allison.

Chrysler Forms New Division For Missiles Manufacturing

Creation of a new Missile Div. at Chrysler Corp. hints at the added emphasis and importance the automobile firm expects to give its missiles development and manufacturing program in the near future.

Chrysler set up the new division in January, with Irving J. Minett as group executive in charge and C. Allan Brady as general manager. Mr. Minett continues to direct the Defense Operations Div. as well.

Earlier this year, Chrysler announced new contracts totaling \$52 million for production of the Jupiter and continued production of Redstone missiles for the Army. Previous research and development contract totals never have been revealed.

The company already has nearly 5000 employees at its missiles manufacturing plant north of Detroit and anticipates adding another 4000 before the end of the year.

This would indicate more contracts in the offing, since the \$52 million already allocated could be used up rapidly on the twin production programs for Redstone and Jupiter. These missiles cost an estimated \$1 million per unit to produce.

Recent successful launching of the Explorer satellite, using an Army Jupiter-C missile as the first-stage rocket, touched off speculation of even further production contracts for the Jupiter.

Cessna Expects 1958 Gain; New Model Is Due In March

Cessna Aircraft Co. anticipates a 15 per cent increase in sales volume during fiscal 1958 and looks to a new single-engine model, due next month, to add to the volume in commercial plane sales.

The company predicts sales will total \$80 million for the year. In the first quarter, ended last Dec. 31, sales increased to \$20.7 million from \$15 million a year ago.

Net income for the first fiscal quarter totaled \$0.63 a share after a write-off for a discontinued four-engine



FAIRCHILD DEVELOPING NEW VTOL PLANE

This is artist's concept of Army VTOL airplane now under development by Fairchild Aircraft Div., at Hagerstown, Md. The plane is designed to achieve maximum lift by means of a vectored slip stream. The company has scheduled the plane to fly later this year.

commercial aircraft project. Before the write-off, net earnings totaled \$2.01 a share.

Cessna reports a current backlog of orders for its twin-engine model 310 running some 25 per cent ahead of 1957.

Lockheed Has Five Designs For Military Use of Electra

Lockheed Aircraft Co. announced that it is ready to produce five military versions of its prop-jet trans-

port, the Electra, for the Air Force and the Navy.

The company said that the proposed versions of the four-engine commercial airliner could be used for training in jamming enemy electronics, high-speed navigation training, personnel transport, hospital-plane duty, and high-speed light cargo transport.

The commercial airline model of the Electra has flown more than 80 hours since its first test flight in December.

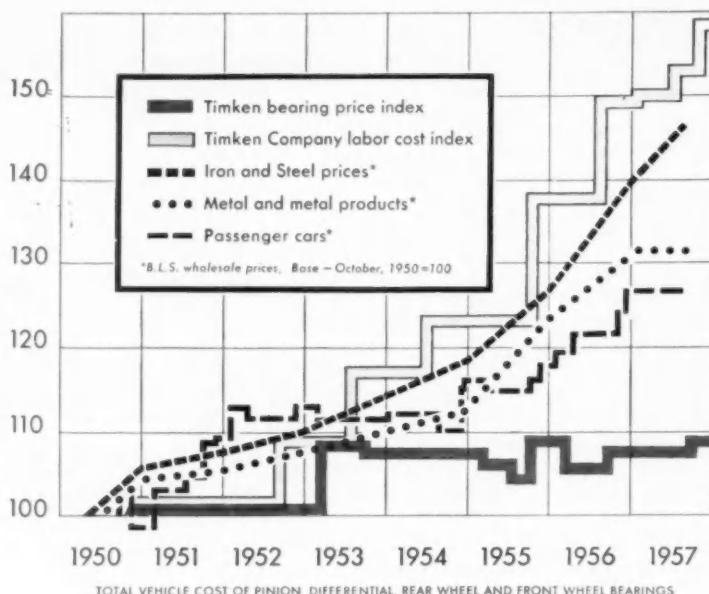


BRITISH JET AIRLINER WILL CARRY 150 PASSENGERS

Model of Vickers VC-10 long-range jet airliner shows how four Rolls-Royce Conway bypass engines will be grouped at the tail. Advantages claimed for this design are a clean wing unspoiled by engine nacelles or pods. This results in a better lift-drag relationship, improved take-off, greater cruising economy, and lower cabin noise. Cruising speed is expected to be more than 600 mph. The two-level fuselage will carry up to 150 passengers on the upper deck, leaving substantial underfloor cargo capacity. Plane is scheduled to fly in 1961.

This chart shows how we've saved you money

Chart the cost of most anything for the last few years and you'll need a taller piece of paper. But see how Timken® tapered roller bearings for the automotive industry have held the line. You helped do it by switching to the new design Timken Moto-Mated bearings made by revolutionary methods in the world's most modern bearing plant.



This picture shows how you can keep on saving

Here's a section of the Moto-Mated bearing plant in Bucyrus, Ohio. Custom built machines like this turn out 30 million new design Timken Moto-Mated bearings annually—from raw steel to packaged bearings without a hand touching them. We've passed the manufacturing savings on to you. You can help us keep your costs down by: 1) standardizing on still fewer Moto-Mated sizes so we can make even longer production runs and 2) use more Timken bearings and increase the manufacturing savings of Moto-Mation. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

**BEATING INFLATION
WITH MOTO-MATION**



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

AUTOMOTIVE INDUSTRIES, February 15, 1958

MEN

IN THE NEWS



Four Wheel Drive Auto Co.—George E. Mallinckrodt was elected chairman of the board.

Tuthill Spring Co.—Logan E. Tutthill was appointed president; Werner F. Fischer, vice-president; Stanley M. Ziolk, treasurer; and Russell L. Venning, company secretary.

Wall Colmonoy Corp.—W. P. Clark has been named president, and A. F. Wall is now chairman of the board.

Brown & Sharpe Mfg. Co., Machine Tool Div.—Thomas F. MacLaren has been appointed general sales manager.

Vertol Aircraft Corp.—Dr. Felix A. Kalinski was elected vice-president.

Sharon Steel Corp., Brainard Steel Div.—Raymond L. Martz was made assistant sales manager in charge of building products.

General Electric Co.—Raymond F. Parker is now manager of cutting tool sales in the Metallurgical Products Department.

Continental-Diamond Fibre Corp.—E. Wayne Frazer was appointed export sales manager; Harold Moyer, Philadelphia district sales manager; and Allen Ballard, district sales manager in the New York office.

Timken Roller Bearing Co.—R. P. Hall has been appointed assistant manager of bearing sales of the Service-Sales Div., and H. C. Renner succeeds him as branch manager of the Atlanta office.

General Electric Co.—Neil E. Firestone has been appointed general manager of the Production Engine Department.



Frontier Bronze Corp.—Theodore H. Booth was elected president, succeeding Ernest H. Holzworth, retired.



Scovill Mfg. Co., Schrader Div.—Robert Rounds is now works manager, and Russell C. Flood has become general operations manager.

International Nickel Co.—Dr. Joseph V. Petrocelli has been appointed head of the Electrochemical Section of the Research Laboratory.

H. K. Porter Co., Inc.—Fred W. Elliott was elected a vice-president.

Du Pont Co.—Richard C. Williams has retired as national automotive sales manager of the Fabrics & Finishes Department.

Bendix Aviation Corp.—Murray Kanes has been appointed director of engineering of the Friez Instrument Div., and Frederick J. Borheck has been named aviation sales manager of the International Div.

Borg-Warner Corp., Warner Automotive Div.—David T. Sickelsteel has been appointed manager of the Detroit office.

Kaiser Aluminum & Chemical Sales, Inc.—Walter M. Gibbs has been named marketing manager of sheet and plate products, and Joseph E. Griffith, Jr., succeeds him as product manager of sheet and plate.

Wagner Electric Corp., Automotive Parts Div.—A. G. Nielsen has become manager of the Pittsburgh Automotive office, and C. N. Wilson succeeds him as manager of the Indianapolis Automotive branch office.

L.O.F. Glass Fibers Co.—Fred W. Segerstrom was named general sales manager of the industrial division.



Clearing Machine Corp.—John Michelotti has become director of operations.



Parker Rust Proof Co.—Max B. Roosa has been elected executive vice-president.

Norton Co.—William G. Fallon was made a vice-president, director, and executive board member.

Studebaker-Packard Corp.—James H. Brenner was promoted to assistant general sales manager, and D. F. Detzler has been named manager of the marketing research department, succeeding Paul A. Rumpf, retired.

Martin Co.—Dr. Albert C. Hall has been named director of research.

Hupp Corp. Div., Hupp Corp.—J. Howard Stoops has been appointed general sales manager.

American Motors Corp.—Meade Moore has retired as automotive engineering and research vice-president.

American Bosch Arma Corp.—Norton C. Sather has been appointed manager of the West Coast office.

Necrology

David J. Giles, 67, senior vice-president of Latrobe Steel Co., died Jan. 5.

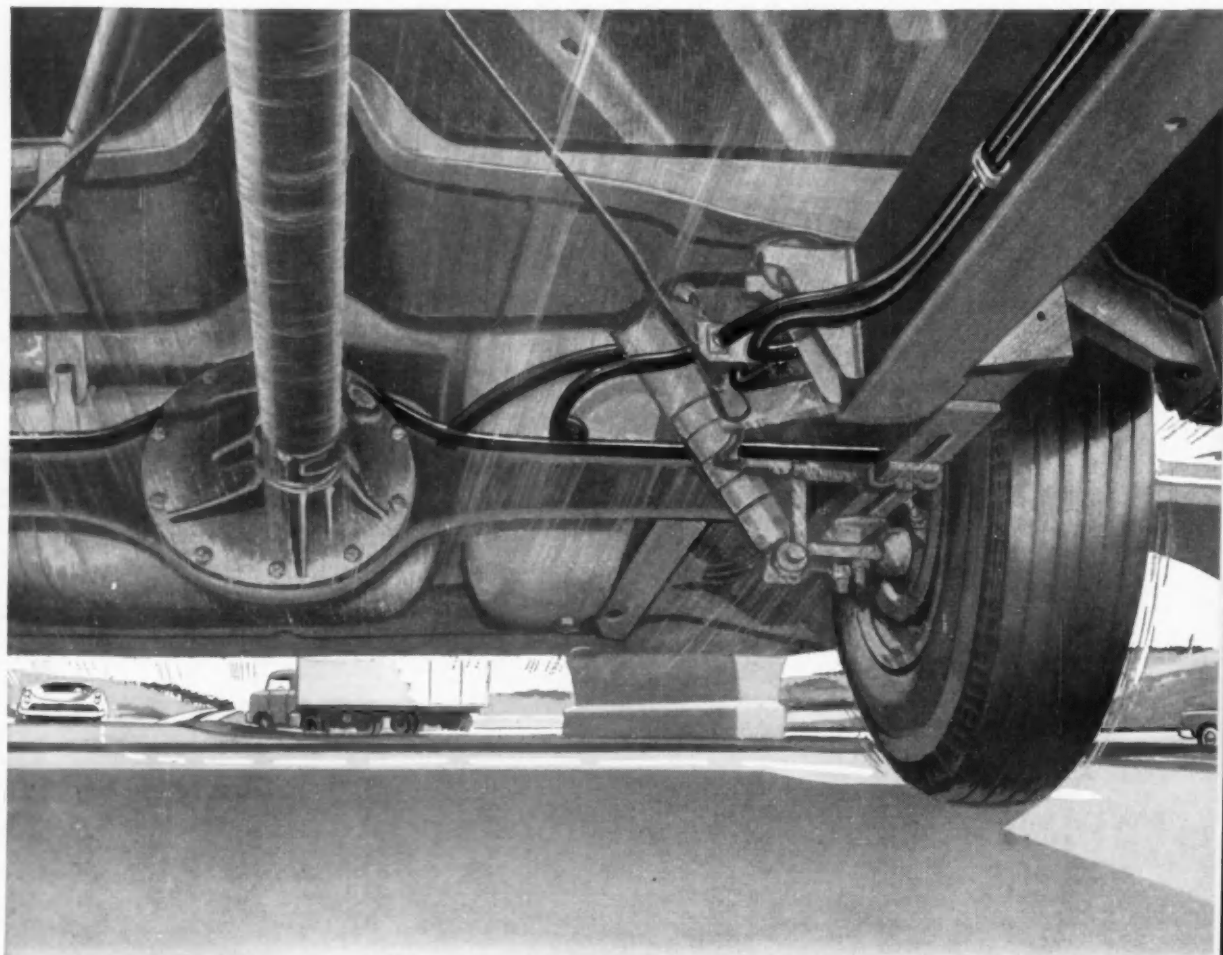
Ernest Heinkel, 70, pioneer German airplane designer, died Jan. 30, at Stuttgart, Germany.

Daniel J. Kennedy, 42, assistant general manager of Buffalo Hydraulic Div. of Houdaille Industries, Inc., died Jan. 24, at Buffalo, N. Y.

George D. Sheffield, 47, purchasing agent for New York Rubber Corp., died Jan. 24, at Poughkeepsie, N. Y.

John C. Lemming, 61, former plant manager of Moraine Products Div., General Motors Corp., died Jan. 24, at Dayton, O.

High-powered cars need Bundyweld



Brake lines take a terrible beating from flying pebbles, pounding vibration. But brake lines made from double-walled Bundyweld take such punishment easily; stay leakproof. Result: supersafe driving for millions of motorists, over billions of miles.

BUNDYWELD IS DOUBLE-WALLED FROM A SINGLE STRIP



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .



Bundyweld, double-walled and brazed through 360° of wall contact.



SIZES UP
TO 3/8" O.D.



NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead, and less chance for any leakage.

full of "go" Tubing to STOP!

Increased weight . . . superhighway speeds call for extra-safe brake lines of Bundyweld Steel Tubing

More than ever, priceless lives depend on safe, sure stops. So remember, when you specify brake-line tubing: For complete safety in emergencies, *only* Bundyweld® Steel Tubing will do.

Double-walled from a single steel strip, Bundyweld stands up under high pressures, brutal shock and vibration fatigue . . . provides an unequaled safety margin. 95% of today's cars use Bundyweld for fuel, oil and hydraulic lines, averaging 20 applications each. Over two billion feet have been used on cars, trucks and buses in the past 25 years.

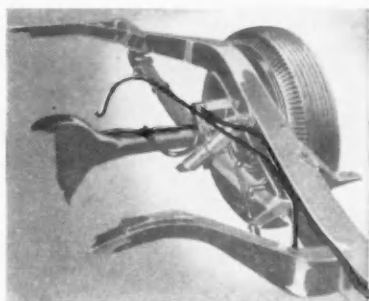
Save with Bundy® services: free, expert design and engineering aid at any product-development stage; fast, economical fabrication service with on-schedule delivery to keep lines rolling. Or Bundyweld is available in lightweight, easy-to-handle straight lengths for fabrication right in your own plant.

Whatever your tubing needs, you'll find there is no real substitute for Bundyweld Tubing and Bundy services. Find out for yourself why automotive engineers everywhere check *first* with Bundy. Call, write or wire us today!

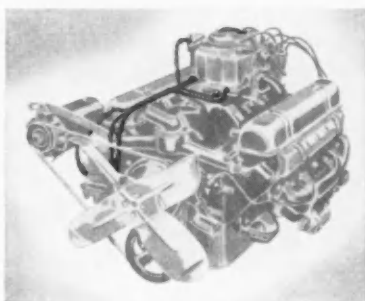
BUNDY TUBING COMPANY, DETROIT 14, MICHIGAN

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING • AFFILIATED PLANTS IN AUSTRALIA, ENGLAND, FRANCE, GERMANY, AND ITALY

Specify Bundyweld for every automotive-tubing use!



Gasoline lines can be pounded by stones, punished by vibration . . . still not collapse or leak when fabricated from Bundyweld. Why? It's double-walled from a *single* steel strip!



Oil lines that leak can cause delays, big repair bills . . . even ruin engines. So specify dependable Bundyweld . . . and get oil lines that are extra-strong — leakproof and trouble-free.



Hydraulic lines for power steering and brake units face high pressures, constant vibration. Fabricate them from Bundyweld, and they'll deliver years of dependable, foolproof service.

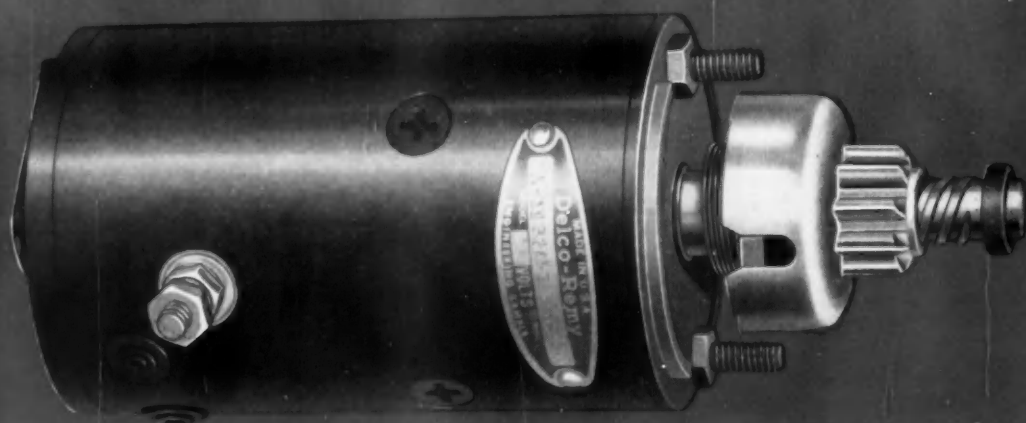
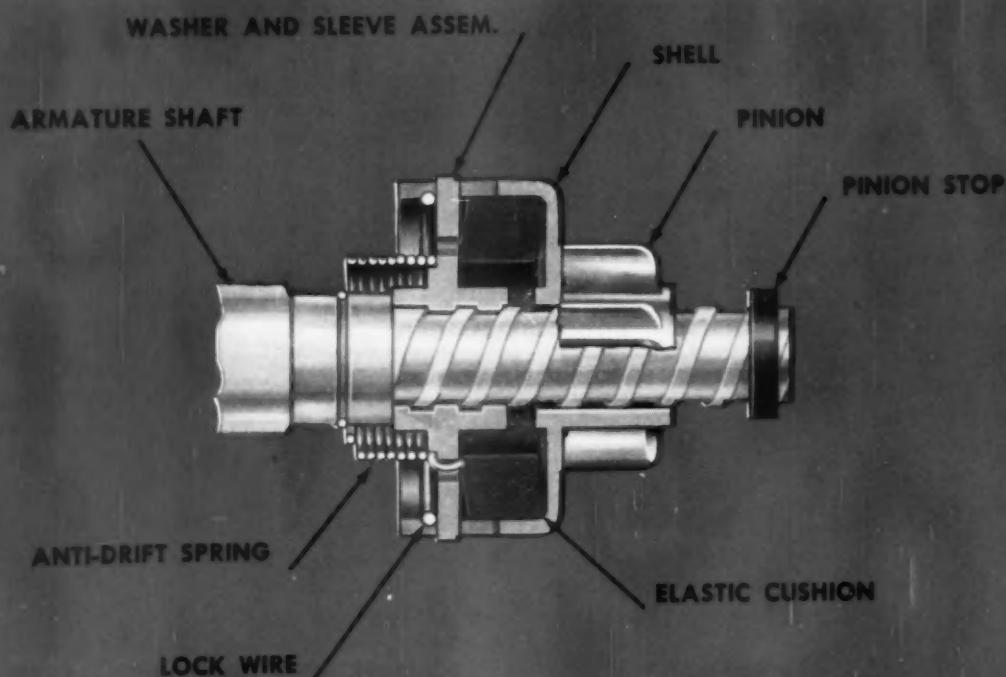
There's no real substitute for

BUNDYWELD® TUBING

Bundy Tubing Distributors and Representatives: *Massachusetts:* Austin-Hastings Co., Inc., 226 Binney Street, Cambridge 42 • *New Jersey:* Atlantic Tube & Metals, Inc., P.O. Box 595, Mountain View • *Pennsylvania:* Rutan & Co., 1 Bala Ave., Bala-Cynwyd • *Midwest:* Lapham-Hickey Steel Corp., 3333 W. 47th Place, Chicago 32, Ill. *South:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg., Chattanooga 2, Tenn. • *Southwest:* Vinson Steel & Aluminum Co., 4606 Singleton Blvd., Dallas, Texas • *Northwest:* Eagle Metals Co., 4755 First Avenue, South Seattle 4, Wash. • *Far West:* Pacific Metals Co., Ltd., 2187 S. Garfield, Los Angeles 22, Calif.; Pacific Metals Co., Ltd., 1900 Third Street, San Francisco 7, Calif.

Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.

PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE



TYPICAL CRANKING MOTOR WITH NEW HIGH-TORQUE DRIVE

DELCO-REMY PRESENTS A NEW HIGH-TORQUE CRANKING MOTOR DRIVE FOR HUSKIER 1958 OUTBOARDS AND OTHER APPLICATIONS

Delco-Remy's newly developed high-ratio cranking motor drive provides ample starting torque for sixty horsepower 1958 model outboards without increase in cranking motor size or the use of reduction gears. Where inches and ounces count, this new, lighter, more compact mechanism allows design engineers vital latitude in engine development. The new unit eliminates bulky overlapping parts common to earlier inertia drives and permits the use of a smaller pinion which provides higher ratio cranking without increase in ring gear size, or the same ratio with a smaller ring gear. All parts of the new drive are light but rugged, and assembly or disassembly is quick and easy. Construction details are shown in the cross-section view on the opposite page.

Available now for original equipment applications, the new drive can be supplied on cranking motors suitable for engines up to 150 cubic-inch displacement. This new drive is yet another example of Delco-Remy leadership in electrical equipment "Wherever Wheels Turn or Propellers Spin." Manufacturers of engines and power equipment are invited to write directly to Delco-Remy for complete information and engineering assistance on the application of these units.

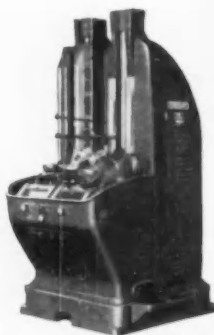
DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA



GENERAL MOTORS LEADS THE WAY—STARTING WITH

Delco-Remy

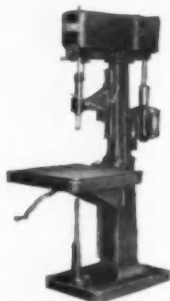
ELECTRICAL SYSTEMS



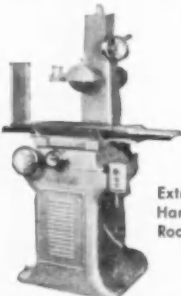
Duplex Surface Broaching Machine
5, 10, 15 and 25 Ton capacity



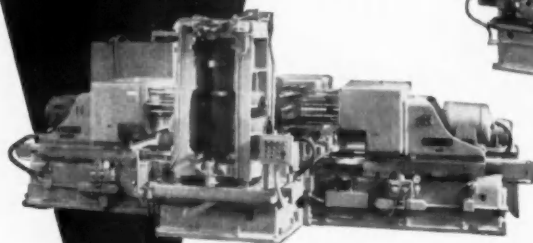
Single Slide Broaching Machine
5, 10, 15 and 25 Ton capacity



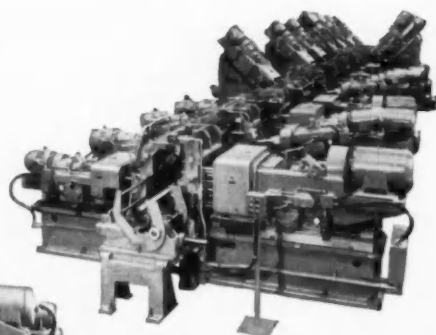
1, 2, 3, 4 and 6 Spindle
Sensitive Drilling Machines



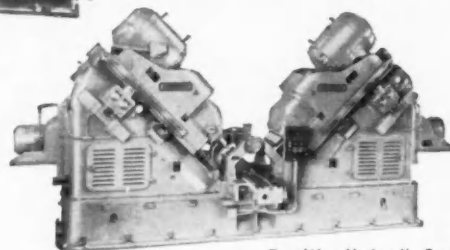
Extremely accurate
Hammond Tool
Room Grinder



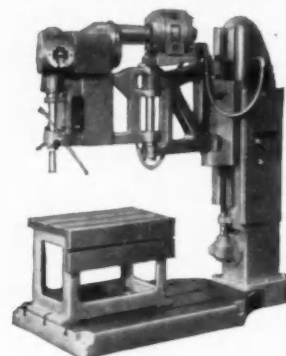
Three Way, 63 Spindle Central System Type, Hydraulic Feed, Horizontal Drilling and Boring Machine with Hydraulically Operated Fixture in Loading Position



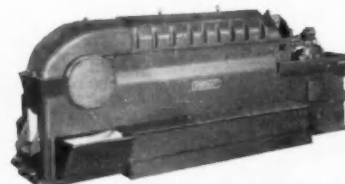
Station Type Machine Having 27 Stations,
139 Spindles for Processing a V Type
Automobile Motor Cylinder Block



Two-Way Hydraulic Feed
Vee Type Stub Boring Machine



Unique Bracket Type Hammond
Radial Drilling and Tapping Machine



Continuous Type Broaching
Machine Built in Five Sizes

FOOTBURT

*line of
production machines*

Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways . . . Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Hammond Surface Grinding Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

THE FOOTE-BURT COMPANY, Cleveland 8, Ohio

Detroit Office: 24632 Northwestern Hwy., Detroit 35, Mich.

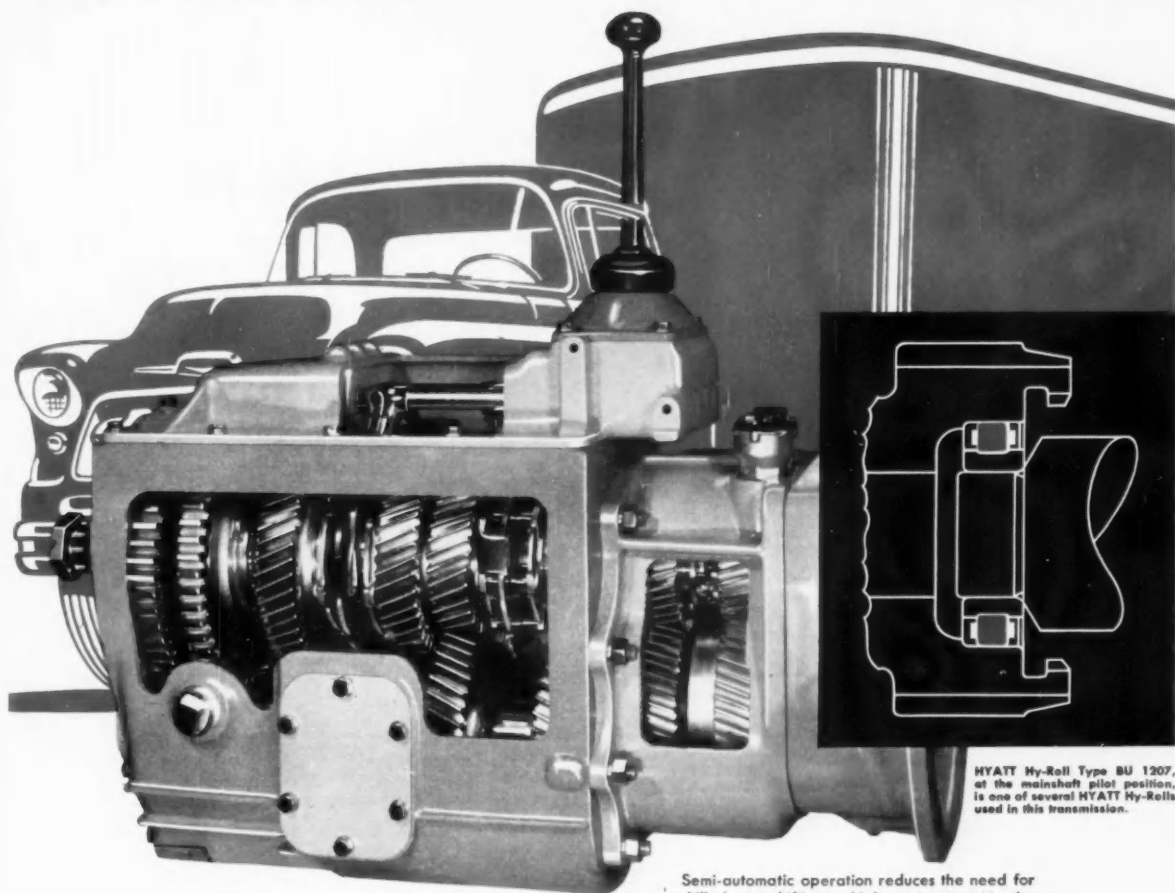
**ENGINEERED
FOR
PRODUCTION**

Write for Catalog

FOOTBURT

MACHINE TOOLS

HEAVY-DUTY TRANSMISSIONS THRIVE ON HY-ROLLS



HYATT Hy-Roll Type BU 1207, at the mainshaft pilot position, is one of several HYATT Hy-Rolls used in this transmission.

Semi-automatic operation reduces the need for skilled gear shifting on highway transport trucks.

CLARK USES HYATT HY-ROLL BEARINGS FOR NEW STEPMATIC TRUCK TRANSMISSION



When Clark Equipment Company designed this new unit—to provide 10 gear ratios for severe hauling conditions—they chose HYATT cylindrical roller bearings for their ability to carry extremely heavy radial loads without restricting lateral movement, and their ease of assembly in difficult positions. Clark depends on HYATT engineering service and production leadership for the *best* in bearings. So can you! Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.; Detroit; Chicago; Pittsburgh; Oakland, Calif.

THESE LEADING COMPONENT MANUFACTURERS ALL USE HYATT BEARINGS:

- | | |
|--|---|
| ★ CLARK EQUIPMENT COMPANY
(transmissions and axles) | ★ DANA CORPORATION
(Spicer transmissions) |
| ★ EATON MANUFACTURING COMPANY
(axles) | ★ FULLER MANUFACTURING COMPANY
(transmissions) |
| ★ ROCKWELL SPRING AND AXLE COMPANY
(Timken-Detroit axles) | |

THE RECOGNIZED **LEADER** IN CYLINDRICAL BEARINGS

HYATT **HY-ROLL BEARINGS**
FOR CARS AND TRUCKS





Lincoln cars just entering the final flat-top assembly conveyor. The body hangers, on which the vehicles were suspended up to this point, release automatically and return to the start of operations.

**By
Joseph
Geschelin**

Special Techniques Employed for Installing Running Gear and Power Plants in Cars of Unitized Body Construction

Assembling Lincolns and Continentals

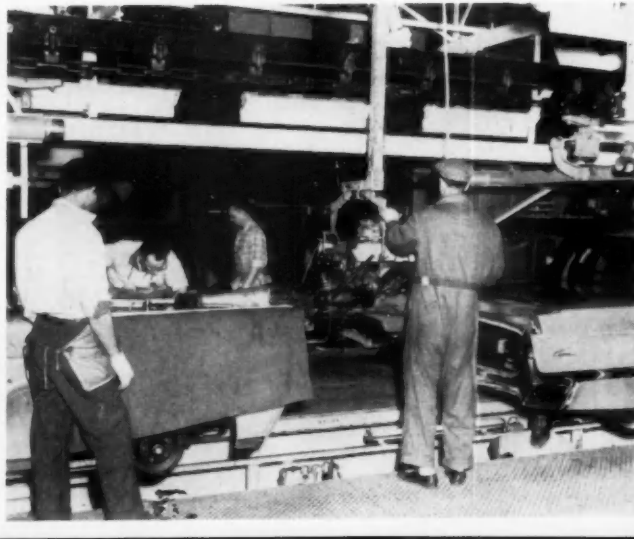
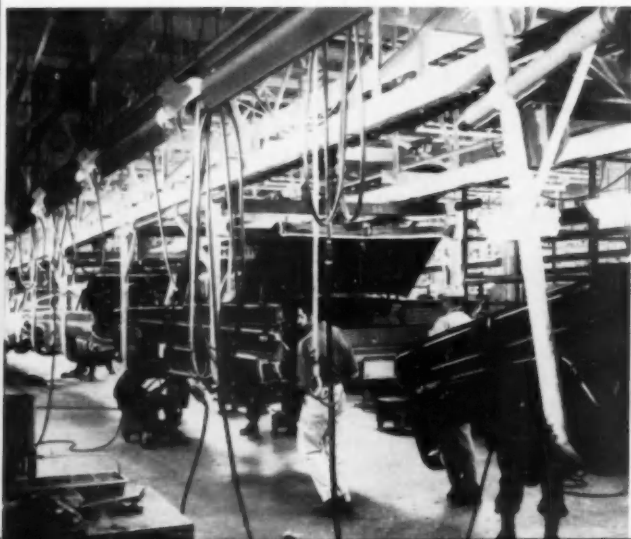
SUPPLEMENTING a preliminary article on the new Lincoln plant in Wixom (Mich.) which appeared in *AI*, November 15, 1957, this article is largely a pictorial presentation showing some of the major steps in car assembly. Since the 1958 Lincoln and Continental cars feature unitized body construction, the method of installing running gear parts is necessarily a complete departure from the conventional.

Picture below shows one section of the suspended assembly line. Various parts are installed by the operators, including rear bumper assemblies, as seen in the foreground. In picture at right powerplant assemblies are removed from the

Consequently, the various details selected here may be of real interest to our readers.

In the previous article we showed some of the steps in the building up of the unitized body structure, the key operation being the integration of the entire shell in the massive framing fixture. Next follow the various stages of body-in-white procedure; and finally the body shells are transported by conveyor to the

engine dress-up line and transported to the assembly line for installation. As the engine is lowered into place operators both above the line and in the pit work together to fit into place and make up the fastenings.



second floor paint shop. The floor plan of the paint shop was reproduced in the previous article.

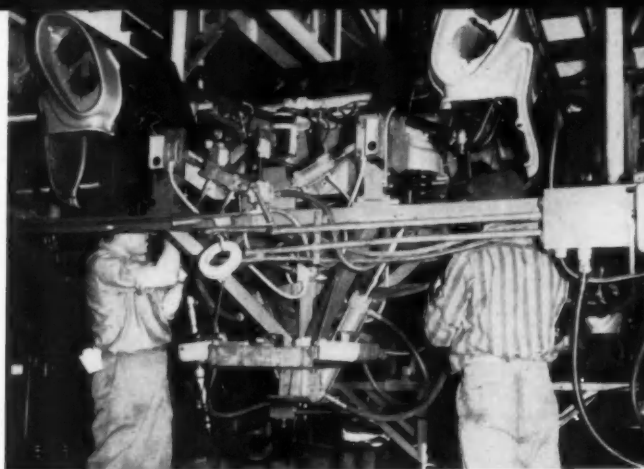
One major change has taken place since regular production was initiated. This has to do with the paint dip following application of the phosphate coating. The procedure now is to employ a water-base paint instead of the conventional black paint used heretofore. This is a latex-base material supplied by Glidden. The lower section of the entire body structure is immersed to a depth of 28 in. Upon leaving the dip tank bodies move within an enclosure that permits drip to remove excess paint, and a blow-off that removes paint from interior sections. Then the bodies continue within an enclosure on the roof through a gas-heated drying tunnel. In addition to better corrosion resistance, another advantage of the water-base paint material, according to Lincoln, is that it does not contain volatile solvents, hence it is inert and free from the usual hazards of fire or explosion.

Upon completion of the paint cycle on the second floor, bodies return to the first floor by elevator, and are stored in banks for release to the trim line according to schedule. The entire conveyor system in this plant was installed by Mechanical Handling Systems and Conveyor Engineering Co. Special cars are employed at various junctions to move bodies from one line to another.

In the interest of space saving, the trim lines as well as other lines on the first floor, are arranged in parallel rows. In the case of trim there are five parallel rows of trim lines. At the terminal end of the fifth trim line, bodies are stored in banks ready for scheduling for the final assembly line.

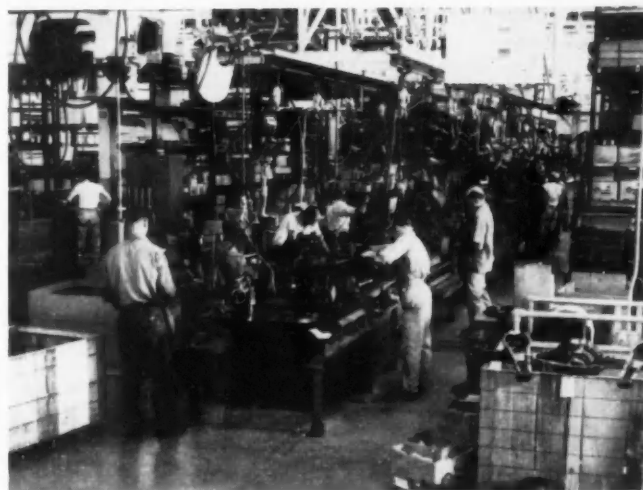
With unitized bodies the final assembly procedure begins with bodies moving on an overhead conveyor. As it comes out of the trim bank, the body carried on a skid, is picked up by the carrier on the monorail. At the same time, the skid is lowered away and returned to the start of the body-in-white line.

(Turn to page 160, please)

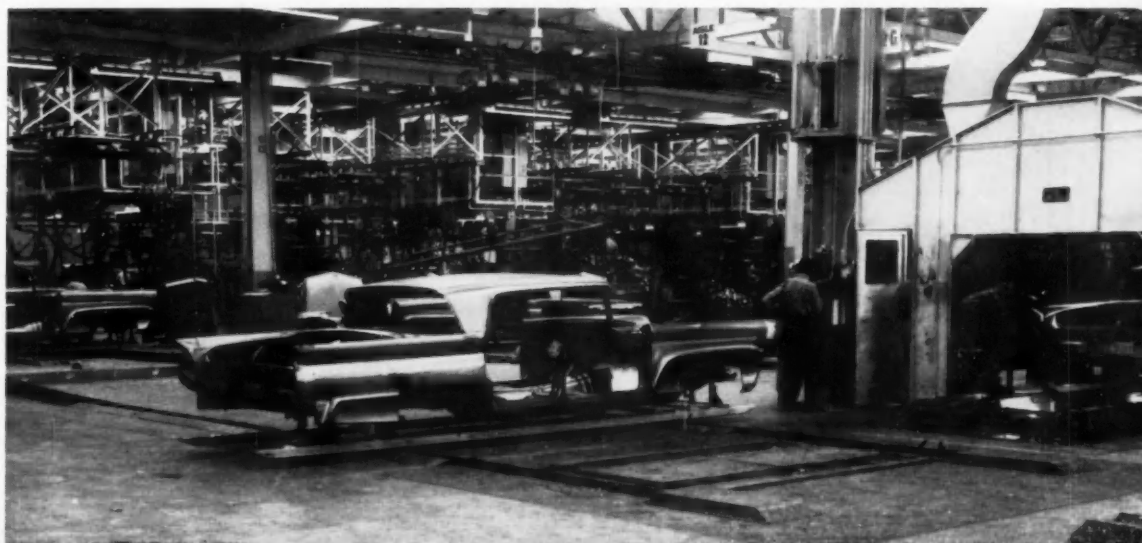


Close-up of the fixture for completing the front suspension assembly. It is employed primarily to compress the coil springs.

Short assembly conveyor for completing the rear axle assembly. Cars may be seen approaching this point overhead from the left. The conveyor dips downward in the background to the right at a convenient height to permit installation of the rear end assembly.



One of the automatically-operated cross transfer lines which move bodies from the body-in-white line to the various booths such as the Newcomb-Detroit booth seen here. Similar transfer lines are found at the various spray booths in the paint shop.



New Design and Construction of

PART I

Air Springs for Passenger Cars

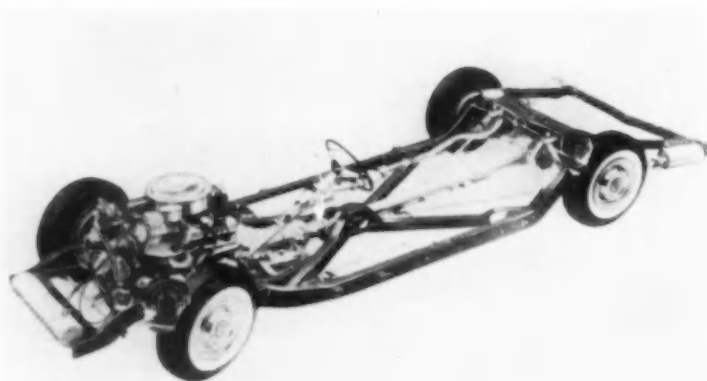


Fig. 1—Buick Air-Poise suspension chassis

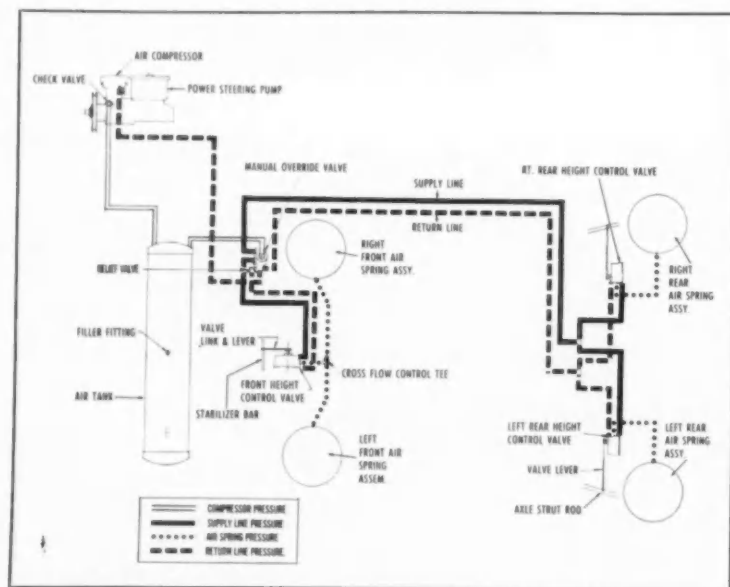


Fig. 2—Buick Air-Poise control system

SUSPENSION systems for American passenger cars have not changed radically since the general adoption of independent front suspension more than 20 years ago. Improvements have, of course, been made in spring design, shock absorbers, and details of the components, but basic principles have remained essentially the same. Now, for 1958, a number of passenger cars are offered with air suspension systems as optional equipment (except the Cadillac Eldorado Brougham where it remains standard).

Five excellent papers devoted to the new suspension systems were presented at the Annual Meeting of the Society of Automotive Engineers held in Detroit last month. These covered details of Buick, Ford, Chevrolet, Oldsmobile, and Rambler. The following article is prepared from material in these five papers. It covers overall layout of the systems and air springs. Part II, prepared from the same papers and devoted to leveling valves, auxiliary components, and compressors will appear in an early issue of *AUTOMOTIVE INDUSTRIES*.

OVERALL LAYOUTS OF SYSTEMS

Buick

Figure 1 shows a view of the Buick chassis. It will be seen that the previous front and rear coil spring suspensions with the torque tube drive permitted installing air springs with a minimum of change.

The control system is shown dia-

Authors of the SAE Papers From Which Material Was Obtained for this Article

Forest McFarland, Gail Peckham and Eric Dietrich.
Buick Motor Div., General Motors Corp.—"The Buick Air-Poise Suspension."

C. F. O'Shea, Ford Motor Co.—"The Ford Approach to Air Suspension."

K. H. Hansen, J. F. Bertsch and R. E. Denzer, Chevrolet Motor Div., General Motors Corp.—"1958 Chevrolet Level Air Suspension."

R. W. Perkins, Oldsmobile Div., General Motors Corp.—"Oldsmobile New-Matic Ride."

Wallace S. Berry, American Motors Corp.—"The Air Coil Spring."

grammatically in Fig. 2. Air is furnished by a two-cylinder compressor driven by the engine through a V-belt at 1.15 times crankshaft speed, delivering air up to 290 psi stall pressure. Air from the compressor passes through a check valve to a high pressure storage tank of approximately 820 cu in. volume, located at the front of the chassis. From the storage tank, the air is conducted to a reducing valve in the manual override valve set at 145 psi to maintain a constant pressure supply in the system.

From the manual override valve,

air is piped to a front height control valve through a check valve. The height control valve is operated by the lever from the center of the stabilizer bar to obtain the average of the car height at both front wheels. This valve permits air to flow to the air springs when the car is below design height or to escape from the air springs when the car is above it. The air from the front height control valve to the air springs passes through a cross-flow valve, which consists of a double check valve permitting unrestricted flow to either, but restricted flow from each to minimize

cross-flow from one air spring to the other under roll.

Air flows to the rear right and left height control valves, controlling the height of the car at the right and left air springs in the same manner as the front except that each wheel is controlled separately. Each of the two valves at the rear maintains pressure in each of the air springs in accordance with the load on that air spring, maintaining levelness of the car laterally and helping to maintain constant frequency by increasing the rate of the spring in the vicinity of the increase in load.

Air from the three height control valves returns to the manual override valve and then to the compressor inlet or to the air cleaner, depending on whether or not the compressor is running. Any "make-up" air required by the compressor when the air springs are not exhausting is drawn in through the air cleaner connection. This results in a semi-closed system. Results to date under a wide range of temperature and humidity conditions have not disclosed a condensation problem. The air from the storage tank is drawn from the center of the tank, utilizing the tank as a moisture accumulator. Any casual water collected is drained on the lubricating schedule.

Ford

The system is shown in Fig. 3.

Figures 4 and 5 are schematic diagrams of the air supply system. The function of the air supply system is to maintain the air requirements of the springs and as a triggering agent for the fast leveling mechanism in the valves. The air system is of the "open" type in which air is taken from the atmosphere and after use is exhausted to the atmosphere. This system was chosen instead of a closed system, which reuses the exhausted air, because it eliminates the complications of a low pressure tank and its attendant air lines. Briefly, the system operates as follows:

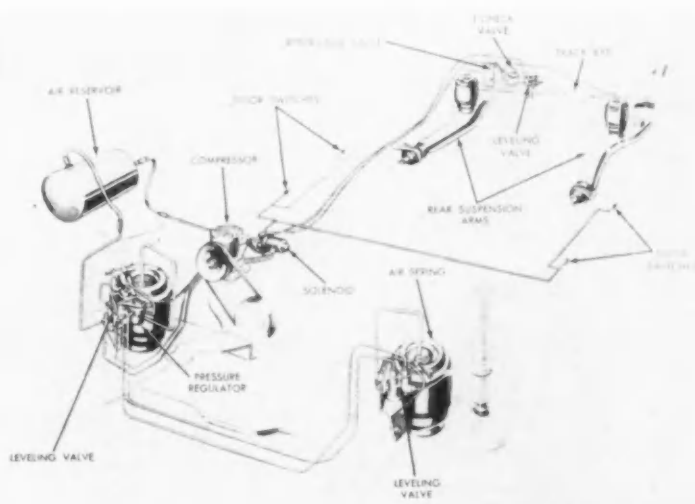


Fig. 3—Ford-Air suspension system

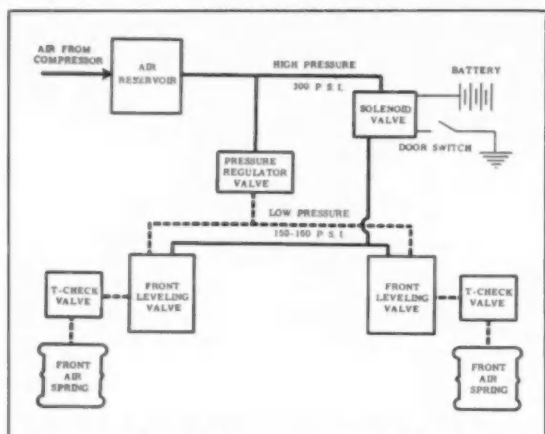


Fig. 4—Ford-Aire front suspension. Schematic diagram of air system components.

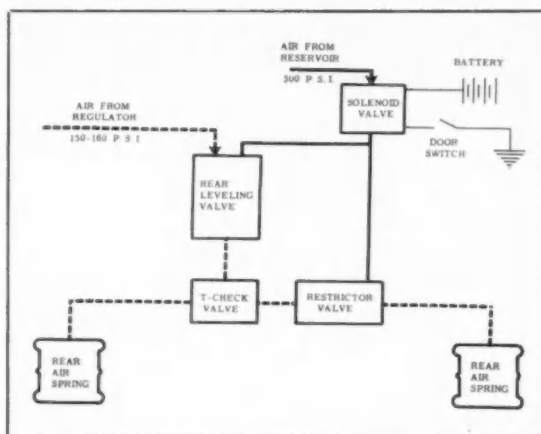


Fig. 5—Ford-Aire rear suspension. Schematic diagram of air system components.

Air from the compressor is supplied to a reservoir which is maintained at approximately 300 psi. High pressure air is routed to a pressure regulating valve which re-

duces the pressure to 150-160 psi. At this pressure, air is routed to the leveling valves, thence through low pressure T-check valves to the air springs. High pressure air is

also routed from the air reservoir to the solenoid valve, thence to the fast action mechanism of the leveling valves and the restrictor valve between the rear air springs.

• • •

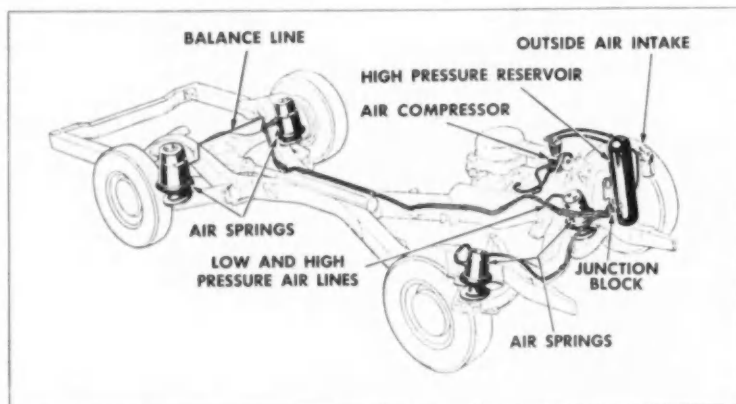


Fig. 6—Chevrolet Level Air suspension system

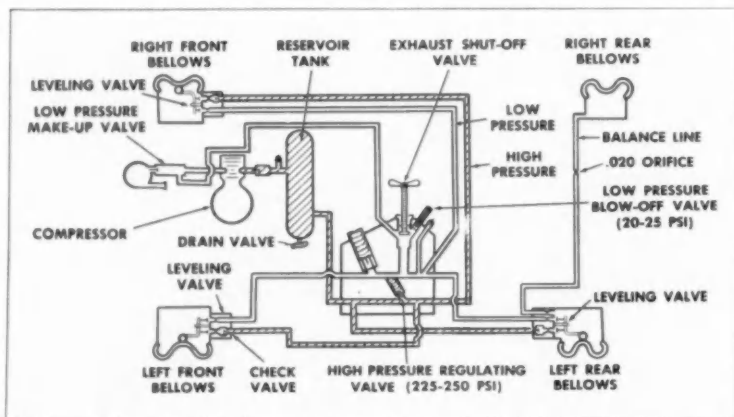


Fig. 7—Chevrolet Level Air control circuit

Chevrolet

Four air spring assemblies are used in the Level Air Suspension system. (Fig. 6). Integral with each of three of the units is a leveling valve which automatically controls vehicle height at all times. Two leveling valves are used in the front, one in each spring, and a single valve is installed in the left rear.

The left rear spring is cross-connected to the right rear spring by a balance line. In order to keep unrestricted cross flow between the two from interfering with the handling of the vehicle, a 0.020 in. orifice is included in the balance line.

A single cylinder compressor, belt driven from the crankshaft, supplies air to the system, directly charging the high pressure reservoir when the engine is running. A complete circuit of supply and exhaust lines to each leveling valve is provided for air circulation. These lines connect to a junction block mounted on the frame. A manual valve in the junction block prevents the exhaust of air from the system. This makes it possible to assemble and inflate the entire

air suspension prior to installing the body and the front sheet metal which mounts the reservoir.

Shown in Fig. 7 is the complete control circuit. The compressor maintains compressed air in the system, taking in outside air only

when required through the low pressure make-up valve. Air pressure in the reservoir tank is limited to 225 to 250 psi by the high pressure regulating valve. Any excess is bypassed to the low pressure system.

Compressed air is supplied to the three leveling valves through the high pressure lines, and exhaust air from the springs returns to the compressor inlet through the low pressure lines, forming a closed system for any given load.

Oldsmobile

The New-Matic Ride chassis (Fig. 8) includes in addition to a new frame (not interchangeable with that used on steel-spring cars), the following major components in the suspension system:

- Four-link rear suspension.
- Diaphragm type air springs.
- Height control valves.
- Air compressor, mounted integrally with the power steering pump.
- Oil and moisture separator.
- High pressure tank of extra-large volume.
- Low pressure tank.
- Pressure regulator and elevator valve unit.
- Copper air lines throughout the system.

A large high pressure tank is mounted on the right rear of the chassis. Its function is to store the filtered air from the compressor until needed by the height control system to maintain car standing height. A tire valve fitting is located at the rear of the tank to permit recharging of air in the system and pressure checking in service. This tire valve also connects to a rubber hose inside the tank which acts as a siphon to drain off any moisture that may have collected in the high pressure tank.

Oldsmobile's exclusive closed system has a low pressure tank which collects air exhausted from the springs and stores it for re-use in the high pressure system as needed. This minimizes the need for fresh air make up in the system, and consequently reduces liability of contamination from moisture and dust. Maximum pressure in the low pressure system is

limited to 70 psi by the blow-off valve in the oil separator.

Protection against over-inflation of the air spring assemblies is assured by limiting the high pressure to 150 psi through the pressure regulator valve in the elevator valve assembly. The elevator valve assembly provides a manual control that allows the driver to raise the

car approximately four inches higher than normal if this should become necessary to clear steep ramps or difficult driveway approaches. The elevator lever on the instrument panel must be held out to maintain this four inch elevation; and as soon as it is released, the car automatically returns to normal height.

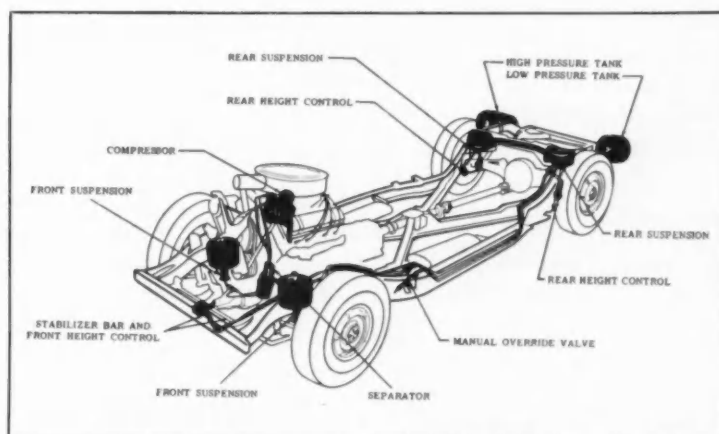


Fig. 8—Oldsmobile New-Matic Ride chassis

Rambler

In American Motor's air suspension system, air springs are used at the rear wheels only. Such a system enhances the four coil spring suspension by utilizing the air springs to the best advantage for leveling, and for maintaining essentially the same riding characteristics with the car either empty or fully loaded.

Other considerations which influenced the adoption of this system were minimum complexity and number of parts, maximum interchangeability with the standard coil spring suspension, ease of

manufacturing and servicing, and low cost.

Fig. 9 is a schematic arrangement drawing showing the simplicity of the system. A Bendix-Westinghouse compressor having a piston displacement of 2.7 cu in. supplies one cubic foot of air per minute at 150 psi, at 50 mph. This compressor is driven from the engine by a belt.

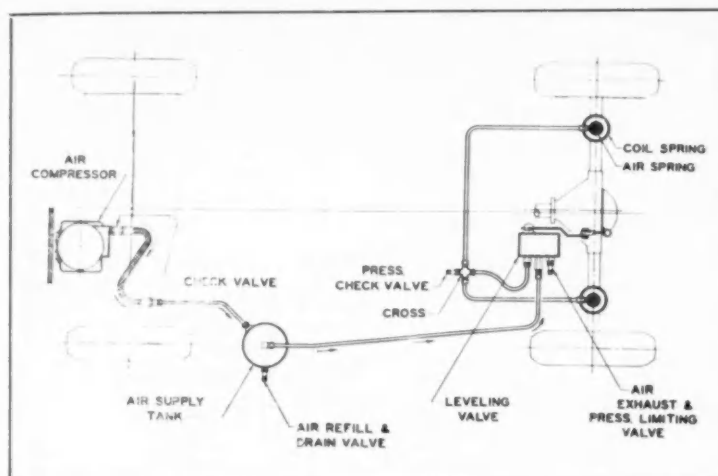
It is driven at 1.1 times engine speed on the V-8 engine and 0.85 times engine speed on the six-cylinder engine. The maximum pres-

Fig. 9—Rambler Air Coil Spring suspension

sure occurs when there is no requirement for air and is controlled by the compression ratio of the compressor. This maximum pressure is approximately 300 psi. The compressor is lubricated with oil piped from the engine oil system.

A 280 cu in. supply tank is located under the right front fender. The piping from the supply tank to the air springs is by means of 3/16 in. heavy wall nylon tubing connected with self-align fittings. The total volume of both air springs is 110 cu in. This relative-

ly small volume means that there is no problem in supplying sufficient air for leveling.



AIR SPRINGS

Buick

The Buick design is illustrated in Fig. 10 which shows the front member. This construction embodies a diaphragm of two-ply nylon cord design, rubber-coated inside and outside. Fig. 11 shows a section through the rear member which is similar in construction to the front. The inner portion of the rear carries a plug snapped into a hole in the top of a piston-like member carrying a bearing similar to the front.

The front air springs have an area of 25 sq in. and a volume of 300 cu in. at normal design height, while the rear air springs have an area of 12 sq in. and a volume of



Fig. 10—Buick air spring—front

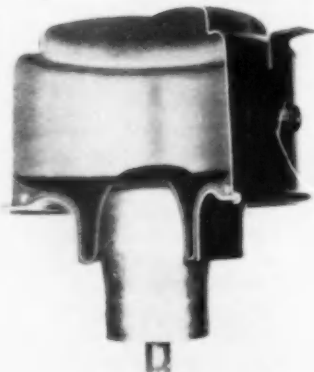


Fig. 11—Buick air spring—rear

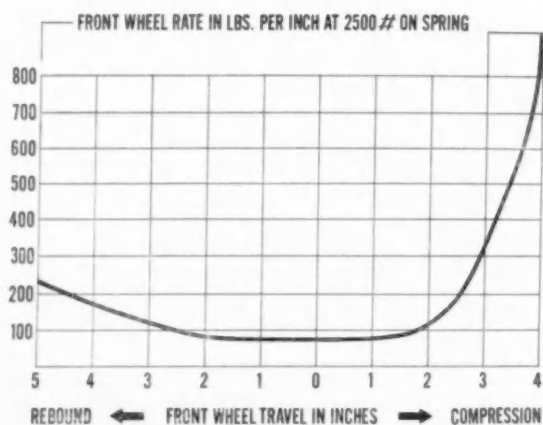


Fig. 12—Buick front rate curve

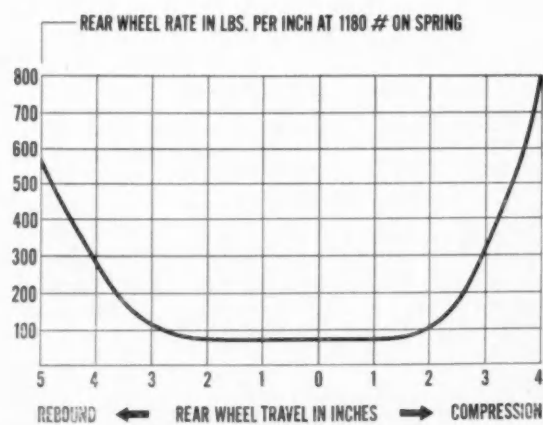


Fig. 13—Buick rear rate curve

235 cu in. at normal design height. Operating pressures, which vary with load, are in the neighborhood of 100 psi for a five-passenger load, depending upon the model of the car. Because the front air springs act through a linkage of approximately 1.9 to one and the rear air springs act directly, these sizes result in wheel rates of 71 lb per inch front and 81 rear, or less, depending upon the model of the car, at normal design height front and rear. This rate varies as shown in Fig. 12 for each front spring and Fig. 13 for each rear spring. This variation is due to the air compression curve characteristic of approximately $PV^{1.3} = K$, plus the change in size of the inner piston and outer container diameters through the stroke, plus a slight effect due to cord angle. The change in effective diameter of the piston and diaphragm at positions above and below the design height is illustrated in Fig. 14. It will be noted that the effective diameter is established at the lowest point of the rolling diaphragm. It can also be seen that there is a certain amount of stretch in the diaphragm as it passes from the inner diameter to the outer, resulting in a lowering of the cord angle measured from the horizontal. Experience to date has indicated the length of the curve giving low rate either side of normal design height is desirable for boulevard smoothness.

This change in rate permits a

soft boulevard ride, but a definitely increased rate either side of the normal design height gives increased ride stability on rough roads.

The sizes arrived at have resulted in a frequency of 43 cpm front and 52 rear, regardless of load, with the car in the vicinity of design height. This is due to the fact that a greater load causes a higher pressure in the air spring, resulting in a higher rate curve. Since the frequency is proportional to the square root of the stiffness of the air springs divided by the mass, the product is substantially constant.

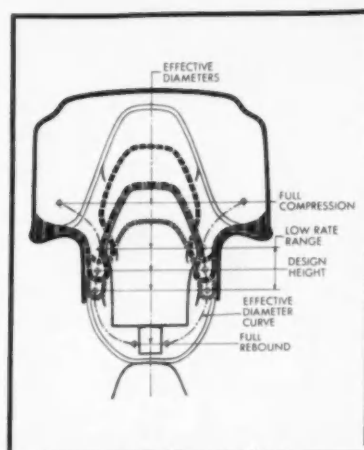


Fig. 14—Buick air spring effective diameters

Ford

The Ford front air spring unit shown in Fig. 15 consists of four basic parts—the rubber diaphragm, the support sleeve or girdle, the piston or pedestal, and the upper seat and air pipe assembly. In addition, the rear unit has retainers at both upper and lower seals to prevent unseating if the shock absorbers are removed or disconnected while the car is on a hoist.

Contouring of the piston and using diagonal cord angles was adopted to approach the ideal load-deflection curve, and obtain ample diaphragm strength in all directions. By contouring the piston, it is possible to change the effective

area, which is the major factor in determining the rate characteristics as the piston travels up and down in the rubber diaphragm. The piston was modified by giving it an hour-glass shape which changes the area-pressure relationship to give a low ride rate in the center of the ride range, Fig. 16. Below the center portion of the piston, the area, which increases with compression, provides the compression build-up shown in the curve. In the enclosed diaphragm type of spring, with rolling lobes, the hour-glass type piston also gives a rate build-up in rebound, as shown. As full rebound is approached, the diaphragm lobe

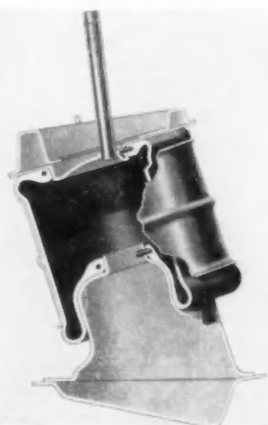


Fig. 15—Ford front air spring unit

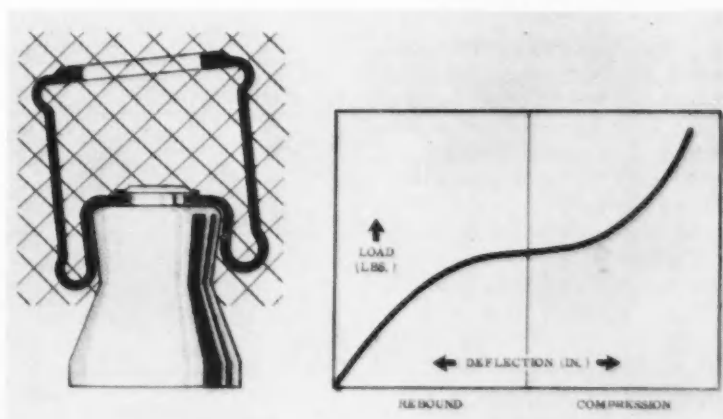


Fig. 16—Ford air spring, illustrating hour-glass piston

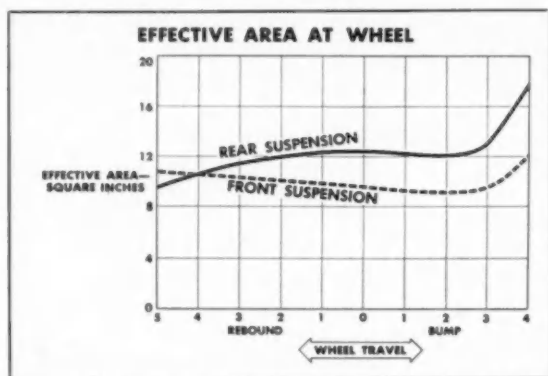


Fig. 17—Chevrolet air spring effective areas

becomes larger and is forced out to increase the effective area, while the pressure is decreasing because of increasing volume. Both of these factors result in marked rate build-up.

Other less influential factors, such as container configuration, molded diaphragm shape, thickness, cord modulus, and rubber compounding were tailored to secure the final shape of the load deflection curve to provide optimum performance with acceptable durability.

For satisfactory performance of the springs on the car, it was found important to maintain the air pressure as it enters the spring at 150 to 160 psi. The pressure regulator performs this function. It was found that if the system were operated at the normal 300 psi reservoir pressure with a rear spring pressure of 80 psi, for example, there would be approximately a 220 psi differential to fill the rear springs and an 80 psi differential to exhaust them to atmosphere. On a long stretch of rough road, especially washboard, far more air would be admitted during jounce motions than could be exhausted during rebound motions. This soon caused the car to ride hard against the rebound stops. Pressure regulation to 150-160 psi, on the other hand, provides an approximate balance of fill and exhaust differentials of equal value (80 psi) and the car remains in trim regardless of road condition.

• • •

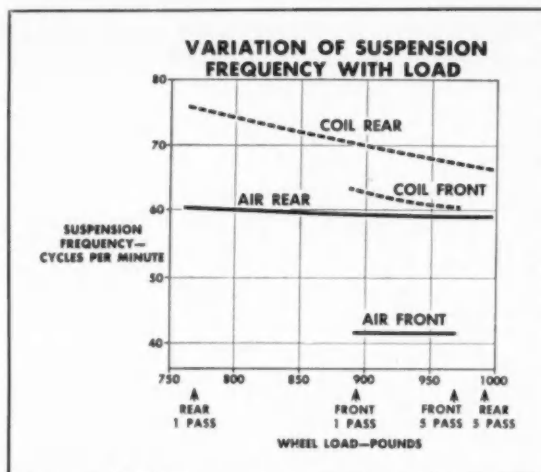


Fig. 18—Chevrolet air spring suspension frequencies

Chevrolet

Effective area curves for the front and rear suspensions of the 1958 Chevrolet are shown in Fig. 17. It can be seen that the rate of change of effective area is very low, even negative, near the design region. Because of this, it is possible to obtain a low rate air suspension in a unit of a size that conveniently replaces coil springs in the front and rear suspensions.

The calculated suspension frequencies of the 1958 Chevrolet are based on the wheel rates (Fig. 18.) Keeping in mind that the frequency varies as the square root of the rate, it can be seen that the air suspension car has much lower rates than the coil spring car. The relatively constant frequency due to leveling of the air suspension is also evident here. This means that

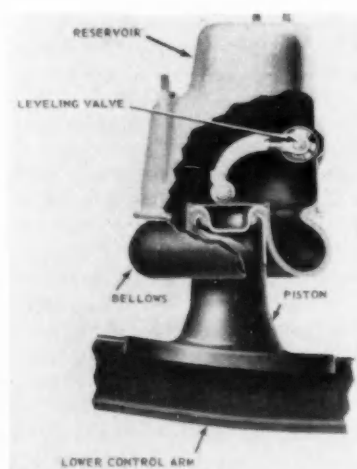


Fig. 19—Chevrolet air spring assembly

ride smoothness in an air suspended car will be relatively consistent regardless of load.

The air spring assembly consists

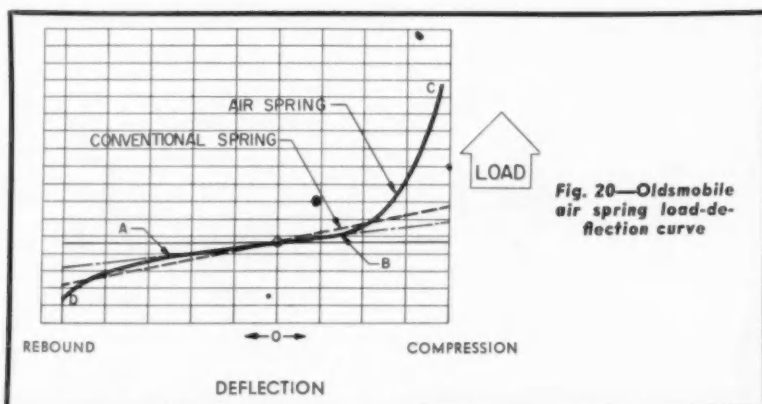


Fig. 20—Oldsmobile air spring load-deflection curve

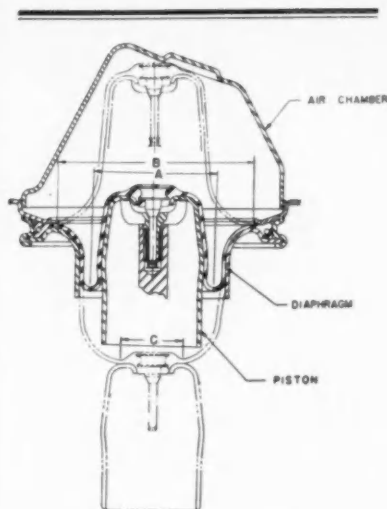


Fig. 21—Oldsmobile rear air spring

of an airtight reservoir, a leveling valve, a single convolution rubber bellows, and a piston (Fig. 19). The lip of the bellows fits into a flange in the reservoir, and is self-sealing in much the same manner as a tubeless tire.

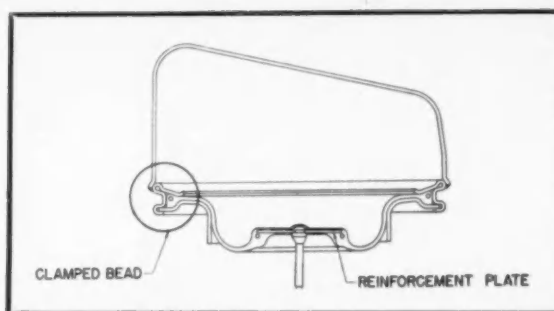
Oldsmobile

The diaphragm-type air springs are designed to operate at 100 psi. While the basic design is the same front and rear, the configuration is necessarily different to suit space limitations and to provide the necessary spring stroke. Spring volume at design height is 295 cu in. in front and 240 cu in. in the rear.

The springs have a variable rate as shown by the heavy line of the load-deflection curve (Fig. 20). In the normal ride range slow movements are possible because the air spring rate is approximately 60 per cent of the conventional steel spring, but as the wheel travels farther into compression and rebound the spring builds up rate rapidly to absorb the energy created by severe bumps or dips in the road, thereby providing greater passenger comfort.

In the diaphragm-type spring, rate is a function of effective area and is controlled by mechanically guiding the diaphragm between the lower ring of the air chamber assembly and the piston (Fig 21). The letters A, B, and C represent

Fig. 22—Oldsmobile air spring construction



the spring in its normal position, full compression and full rebound positions and the change of effective areas which determine the rate characteristics of the spring.

Self-sealing type diaphragms were found to give inconsistent sealing results from day to day, were somewhat sensitive to cold temperatures, and required extra-smooth metal surfaces. It was found that the bead seal was easily broken and required extreme care on installation to assure a leak-free spring. To overcome these difficulties, the spring tank and diaphragm assembly was designed so

that it would withstand all normal pressures without the support of the piston (Fig. 22). The center bead area was closed in and the outer bead designed to seal by rubber compression. The spring tank assembly forms half of the outer bead seat; the crimped ring positions the lower diaphragm retainer forming the other half, and when these parts are assembled in place the outer bead area is compressed into a positive seal. Ordinary tire bead lubricant is applied to the outer bead area before assembly to allow the rubber to flow into the cavity during compression.

• • •

Rambler

A Goodyear Rolling Lobe air spring was designed to go inside the rear coil spring, thus paralleling the characteristics of the air spring with the steel coil spring (Fig. 23). Most of the weight of the empty car is carried by the steel springs having the relatively low rate of 60 lb per inch for the sedan and 96 lb per inch for the station wagon. These rates are approximately 30 per cent lower than the rates used on the same models without air suspension. The rear coil spring rates are lower because the air spring contributes the additional rate necessary for good ride and stability.

A single leveling valve is mounted near the center of the body above the rear axle. With the car empty, 20 psi pressure exists in the air spring and each air spring supports about 100 lb. The steel spring supports 500 lb. As load is added, the leveling valve senses the change and increases the air pressure so that the air spring carries the additional weight of passengers and

baggage. In a loaded station wagon, the air pressure in the springs may be over 100 psi.

Part II of this article on "Air Springs for Passenger Cars" will appear in April 1st issue of AUTOMOTIVE INDUSTRIES.

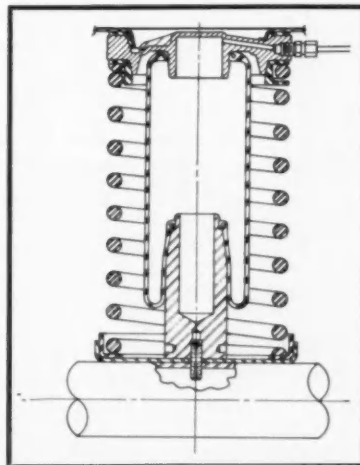


Fig. 23—Rambler air spring and coil spring arrangement



This view of the terminal parking lot at the Lambert-St. Louis Municipal Airport shows a line-up of various models in the rental car section. Employee of National Car Rental System, Inc., hands car keys to a customer. More than 70 per cent of all transient car rental business today is conducted at airports.

Rising Volume of Car and Truck Rentals Spurs Sales of Vehicles and Equipment

GROWING at a rate of 15 to 20 per cent annually or doubling every five years, the car and truck rental and leasing field provides a booming market for sales of new motor vehicles and

equipment. There are now approximately 300,000 cars and 250,000 trucks available for rent or lease, including the many already under long-term contracts.

It is estimated that about 175,000

of the total 300,000 cars now in rental service and leased fleets will be replaced by new 1958 models. This would mean over \$350 million worth of business for the automobile industry on the basis of a fleet purchase price of \$2000 to \$2500 per car.

Hertz Rent-A-Car System, Inc., for example, several months ago purchased 19,737 new 1958 cars at a cost of \$60 million and expects to spend an additional \$33.5 million for 11,000 more 1958 models in April, it also is buying 4000 new trucks costing \$22 million. Another major operator in the field, Avis Rent-A-Car System, also recently disclosed plans to purchase a total of 16,000 new 1958 model cars and trucks at an estimated cost of \$40 million for a 33 per cent increase over its 1957 purchases.

Dollar volume of the some 4000 establishments engaged in the car and truck rental and leasing busi-

Mechanics check and service vehicles in the repair shop of Truck Rental Co., Baltimore, Md. Over 700 trucks leased by this firm are based in Baltimore alone, while other service facilities are maintained by this same lessor company in several other cities.





NuGrape Bottling Co., Atlanta, Ga., recently leased its entire fleet of trucks from Dixie Drive-It-Yourself. Lessor supplies full service for the maintenance of the trucks—fuel, repairs, tires, lubrication, garaging, insurance—everything except drivers.

Avis Rent-A-Car System maintains a fleet of new cars like the Ford shown above at every crossroad of travel — airports, railroad stations, hotels, and downtown business districts. This Tulsa, Okla., station is one of 1262 Avis locations in 859 cities throughout the world.

By

Andrew W. Shearer



ness is expected to top the \$400 million mark in 1958. The percentage of stations which restrict renting and leasing to either cars or trucks, but not both, is extremely small. Hertz, for example, is best known for its car rental service, but about half of its volume comes from trucks, of which 90 per cent are leased on a long-term basis to 2500 commercial companies.

Rates in the car rental industry are computed on the basis of a time charge plus mileage charge. Included in the fees are maintenance and service, gasoline and oil, and insurance. National average is about \$7.50 a day, plus eight cents per mile. Weekly average runs around \$37.50, plus mileage, while

annual rentals vary widely, depending on the size of the fleet and type of car. Average cost to a truck renter is estimated to be somewhat over \$2500 per unit annually.

Replacement Factors

The life of a car in rental service varies according to the locale in which it is rented and the amount of service it receives in a certain period. Due to competitive pressures, operators in large metropolitan areas usually find it necessary to turn over their fleets at least once a year so that current model

cars are always available. Renters in smaller cities, however, may have to run their units as long as two years in order to operate them profitably.

In general, the average life of a rental car in a large city would be nine months to a year or 10,000 miles. As much as 20,000 miles might be put on a rental car in a smaller city before it is sold. Of course, the main consideration is keeping all cars in first-class condition, so the replacement of a unit before the expiration of its normal

(Turn to page 118, please)

New Engines and Accessories

at the

NATIONAL MOTOR BOAT SHOW

STILL higher horsepowers, V-type designs, and compactness were major characteristics of the new engines on display at the 48th National Motor Boat Show.

Held in New York's Coliseum January 17-26, the show had a record attendance of close to 400,000 persons. There were more than 390 displays of boats, marine engines, and nautical accessories. Sponsored by the National Association of Engine & Boat Manufacturers, Inc., the exposition was aimed at a large and expanding market. It is estimated that 7,071,000 recreational craft of all types were in use in 1957. These boats employed about 750,000 inboard gasoline and Diesel engines, and more than five million outboard motors.

All of the manufacturers appeared to be "going all out" in introducing new products to attract consumer purchasing.

New outboard models were shown with rated outputs of 50, 60 and 70 hp. On display was the first Diesel outboard. Re-styling for more modernistic appearance, colors that complement the new model boats, remote controls, and key starter switches were among the featured details.

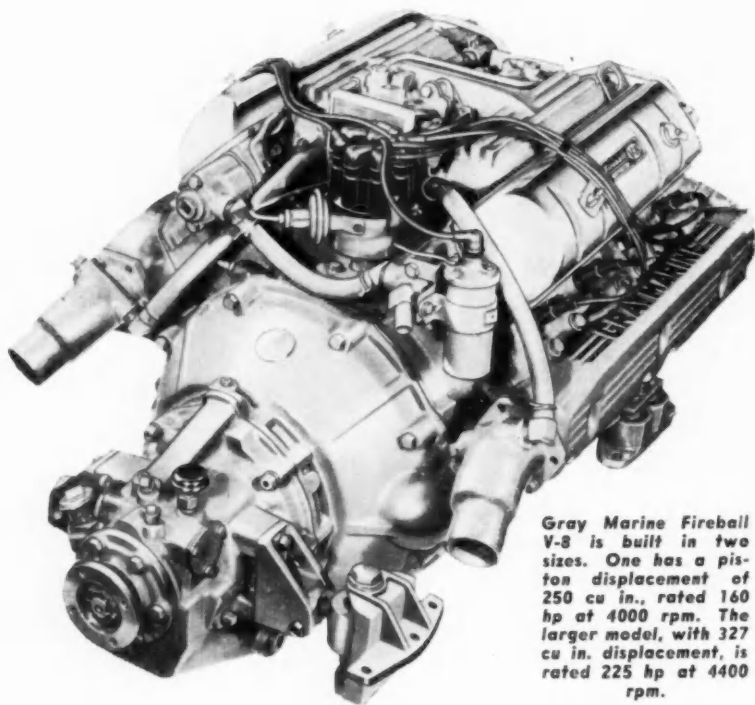
The inboard engines displayed seemed to indicate a popular trend toward V-type design on new models. There were some exceptions. All emphasized compact design, in-

creased power, and added accessibility for routine maintenance.

In the following are brief descriptions of the new engines exhibited by the various manufacturers:

American MARC Inc.

This company introduced what is said to be the world's first Diesel outboard motor. A two-stroke type, it has a novel arrangement of two opposed pistons in a single cylinder, using ports and crankcase scavenging. Bore and stroke are 2 by 1-7/8 in. for a total piston displacement of 18.5 cu in., and rated output is 7 1/2 hp. Compression ratio is 20 to 1. A metered fuel injection



Gray Marine Fireball V-8 is built in two sizes. One has a piston displacement of 250 cu in., rated 160 hp at 4000 rpm. The larger model, with 327 cu in. displacement, is rated 225 hp at 4400 rpm.

system is used, and fuel is pre-combusted.

British Marine Products, Ltd.

An importer of British-made engines, the firm showed new inboard engines of two builders. The 1958 Stuart two-stroke gasoline engine line includes an 8-hp two-cylinder engine designed primarily for auxiliary power in sailboats. The new engine has a three-port system.

Aircooled Diesels in the Enfield line now include the Mark III, a twin-cylinder, 25-hp engine which has horizontally-opposed cylinders for low height.

Crusader Marine Div., Cal Connell Cadillac Corp.

This gasoline inboard engine maker introduced the new Mark V, rated 160 hp at 4000 rpm, and the

By Charles A. Weinert

Mark VII, rated 220 hp at 4400 rpm. Both are overhead-valve V-8's with piston displacements of 283 cu in., and each weigh 700 lb with direct drive. The former has dual side draft carburetors, while the latter has triple dual throat down-draft carburetors. Compression ratio is each instance is 8 to 1.

Dearborn Marine Engines, Inc.

Featured by Dearborn was an improved 150-hp Interceptor in-board engine which has "precision fuel induction," and a newly-designed cylinder head with wedge-shaped combustion chambers and larger valves. It is a V-8, having a bore and stroke of 3.62 by 3.1 in. for a total piston displacement of 256 cu in., and weighs 625 lb. Horsepower rating is at 4000 rpm.

Detroit Diesel Engine Div., General Motors Corp.

Latest developments in the GMC line of two-stroke inboard Diesels were exhibited. They included a 364-hp Diesel for large pleasure craft, a 110-hp unit for small craft, and a new work boat model.

The 364-hp, 660 cu in. engine is a six-cylinder Series 110 unit to which a single-stage turbocharger has been added, boosting the rating 75 hp. The 110-hp engine is a three-cylinder Series 71 unit which is being offered without heat exchanger and with a through-shaft direct drive marine gear as standard equipment.

The new work boat model is a six-cylinder Series 71 unit rated at 170 continuous shaft hp. It is one of a series of newly-developed "E" models in which up to 15 per cent more output is attained. In these models, as well as in all Turbopower models, the air intake ports in the cylinder liners have been enlarged and the number of exhaust valves per cylinder increased from two to four.

Evinrude Motors, Div. Outboard Marine Corp.

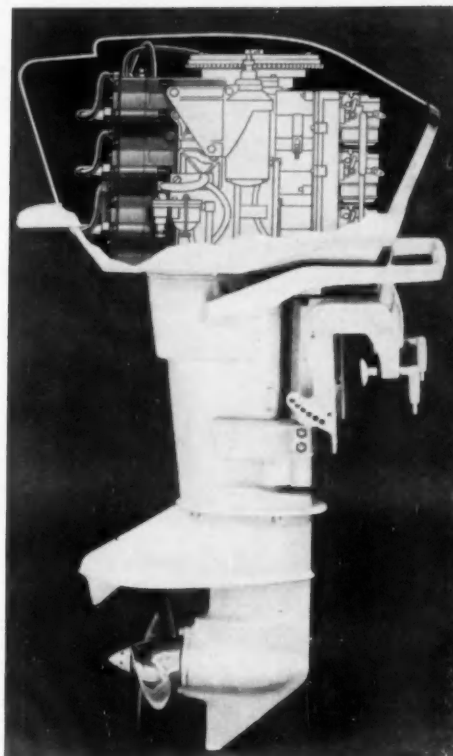
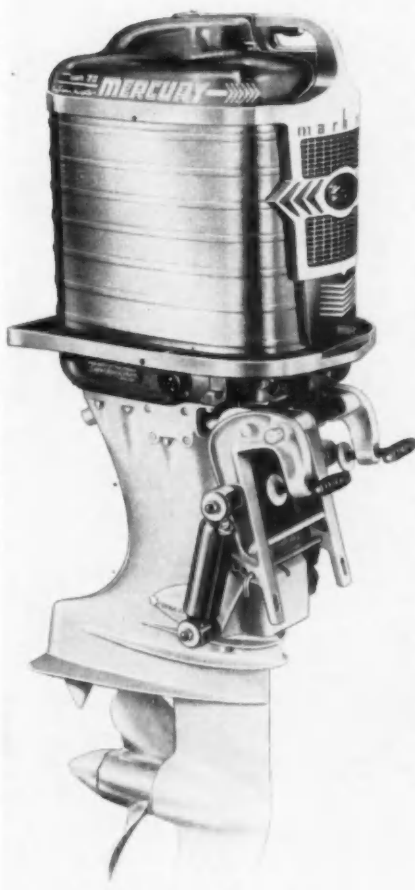
Heading the Evinrude line of 11 outboard motors for 1958 are two new 50-hp units known as the Starflite and Four-Fifty. Both are four-cylinder engines with the cylinders

positioned horizontally in pairs 90-deg apart. They have a bore and stroke of 3 by 2½ in., for a total piston displacement of 70.7 cu in. The 50-hp ratings are at 4000 rpm. The Starflite has electric starting and a weight of 205 lb; while the Four-Fifty is equipped for manual starting and has a weight of 197 lb.

Flagship Marine Engines, Inc.

Introduction was made of a series of three overhead-valve V-8 inboard engines, all of 283 cu in. piston displacement. The Model 220, with a compression ratio of 7.8 to 1, is rated 220 hp at 4800 rpm. Model 240 is a "semi-race" engine having the same specifications as the base engine except for 9.06 to 1 compression ratio and lighter valve and valve springs. It is rated 240 hp at 4800 rpm. The Flagship Model 310 is a "custom competition" engine with "full race

Mercury Mark 78, rated 70 hp, is a 66 cu in., six-cylinder-in-line outboard. It starts and runs in either direction.

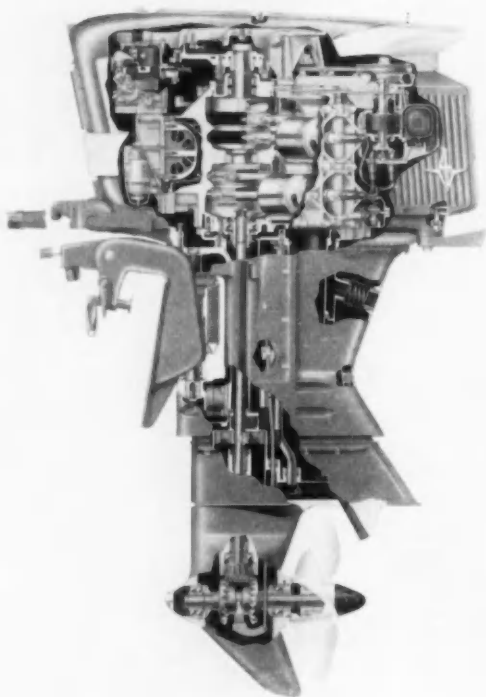


Cutaway of Scott-Atwater 60-hp "Flying Scott" shows in-line arrangement of the three horizontally-positioned cylinders.

cam," 9.86 to 1 compression ratio, and power options to "over 300 hp," available with either fuel injection or dual four-barrel carburetors.

Gray Marine Motor Co., Sub. Continental Motors Corp.

Featured in the Gray Marine display were two new inboard models, called the Fireball V-8's. One is rated 160 hp at 4000 rpm; and has a bore and stroke of 3½ by 3¼ in. for a total piston displacement of 250 cu in. The larger is rated 225 hp at 4400 rpm; and has a bore and stroke of 4 by 3¼ in. for a total piston displacement of 327 cu in. Compression ratio of the 160 is 7.5 to 1; on the 225 it is 9 to 1. Both feature top of engine servicing, and shockless shifting by use of the new "Velvet Drive" hydraulically-actuated transmission recently introduced by Warner Gear Div., Borg-Warner Corp. Other new engines in this line are the Four-85, a four-cylinder gasoline model rated 85 hp at 4000 rpm; and the Six-D802, a six-cylinder Diesel en-



Evinrude Starflite V-4 cutaway. This engine is rated 50 hp at 4000 rpm.

gine of 802 cu in. displacement, rated 190 hp at 2200 rpm.

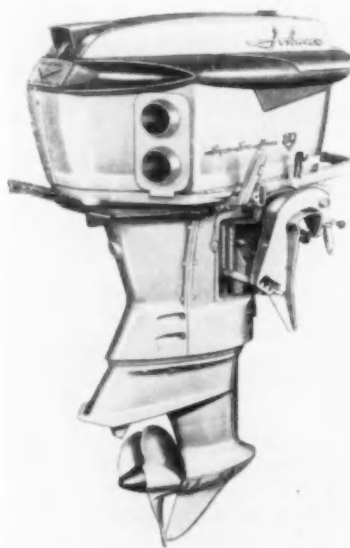
**Johnson Motors,
Div. Outboard Marine Corp.**

New in the Johnson line of outboard motors is a 50-hp, four-cylinder V-type unit called the Super Sea-Horse V-50, and a 35-hp, two-cylinder in-line engine named the Super Sea-Horse 35, both being available with electric starting. The V-4 has a bore and stroke of 3 by 2½ in., for a total piston displacement of 70.7 cu in., and is rated 50-hp at 4000 rpm. The Super Sea-Horse 35 has a bore and stroke of 3 1/16 by 2¾ in. for a total piston displacement of 40.5 cu in., and is rated 35 hp at 4500 rpm. Weights of these engines, with electric starting, are respectively 205 and 138 lb.

Kiekhaefer Corp.

Three new motors were unveiled in the Mercury exhibit at the show, including the Mark 78 claimed to be the most powerful production outboard for 1958. The Mark 78 is a six-cylinder-in-line motor having a bore and stroke of 2 9/16 by 2½ in. for a total piston displacement of 66 cu in., and is rated 70 hp. It starts and runs in either direction,

eliminating the need for a reverse gear. Control is from a single remote lever combining starting, choke, forward, stop, reverse and throttle. Hydraulic shock absorbers, mounted on each side of clamp bracket, snub kick-up of motor when striking an underwater ob-



Johnson Super Sea-Horse V-50 is a four-cylinder V-type outboard which is rated 50 hp at 4000. Its total piston displacement is 70.7 cu in.

ject, and cushion rebound. Weight of the engine is given as 180 lb.

Another new model is the Mark 58, a four-cylinder, 44-cu in. outboard, rated 45 hp and weighing 131 lb. The third new model is the Mark 28, a two-cylinder, 22 cu in. unit, rated 22 hp and weighing 79 lb. All three of these motors have identical bores and strokes.

**Lathrop Engine Div.,
Burmester & Wain American Corp.**

The latest engines being offered by this company are four new gasoline inboard models. One, the Model 30, is a 58 cu in., four-cylinder in-line, overhead valve engine, rated 30 hp at 4000 rpm and weighing 295 lb. The Model 60 is a four-cylinder, L-head engine, having a piston displacement of 133 cu in. and rated 60 hp at 3200 rpm. It weighs 460 lb with direct drive. The other new engines are the Models 130 and 155, both six-cylinder L-head gasoline engines having piston displacements of 320 and 339 cu in. respectively. The "130" is rated 130 hp at 3000 rpm and weighs 915 lb; while the "155" is rated 155 hp at 3400 rpm and weighs 925 lb.

Norseman Marine

Two V-drive inboard engines were presented by this exhibitor, designed for extreme stern installation. One of these, called the Knight, is a six-cylinder gasoline engine, rated 155 hp at 3200 rpm and having a piston displacement of 340 cu in. The other is called the Bullet, and is a six-cylinder unit of 236 cu in. displacement, rated 110 hp at 3400 rpm.

**Oliver Outboard Motor Div.,
The Oliver Corp.**

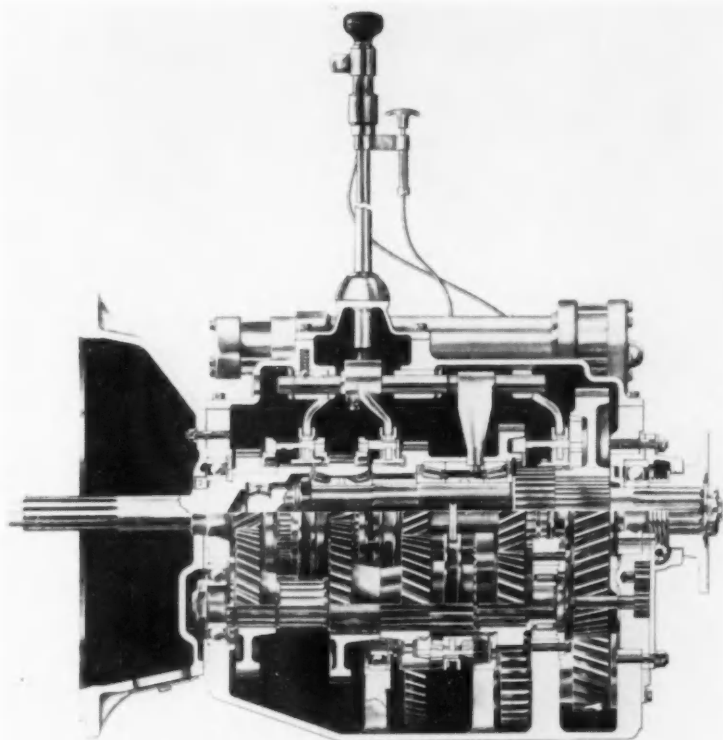
Oliver featured improvements in its line of outboard motors, which range in horsepower from 16 to 35. Both the 16 and 35-hp models have the "Tilt-a-Matic" motor angle adjustment which enables the operator to control motor angle from inside the boat. Standard with the 16 and 35-hp models is the company's fuel tank which automatically proportions oil and gasoline. The 35 also features a Bendix magneto-alternator unit which supplies low-

(Turn to page 124, please)

Details of the Spicer Synchro-Master Transmission

RATIOS

FORWARD	REVERSE
1st. - 10.45 to 1	10.45 to 1
2nd. - 8.38 to 1	8.38 to 1
3rd. - 6.52 to 1	6.52 to 1
4th. - 5.23 to 1	5.23 to 1
5th. - 4.09 to 1	4.09 to 1
6th. - 3.28 to 1	3.28 to 1
7th. - 2.55 to 1	
8th. - 2.05 to 1	
9th. - 1.59 to 1	
10th. - 1.28 to 1	
11th. - 1.00 to 1	
12th. - .80 to 1	



Sectional view of the Model 8125 Synchro-Master transmission

SHOWN here is a sectional view of the Spicer Model 8125 Synchro-Master 12 transmission which is currently being marketed by Dana Corp., headquarters Toledo, Ohio.

Twelve speeds are provided in the new unit to give sufficient low gear reduction and spread to handle various road conditions without the use of either an auxiliary transmission or a two-speed axle, as well as to produce the close steps required

to maintain engine speeds at maximum rpm for fuel economy and to avoid engine lugging.

Blocker-type synchronizers are used in all speeds, forward and reverse. All six low range ratios are available in reverse. Forced feed

lubrication; screen for filtering oil; standard six-bolt S.A.E. power take-off apertures on each side; equally spaced steps between ratios; and replaceable bearing retainer inserts in all case bores, are additional features.

• • •

AMA Grants to Three Schools Will Train Auto Mechanics

The automobile industry, through the Automobile Manufacturers Association, has granted \$145,000 to three universities to aid in training automobile mechanics.

The grants were set up to achieve two ends: to encourage capable students to prepare themselves to teach

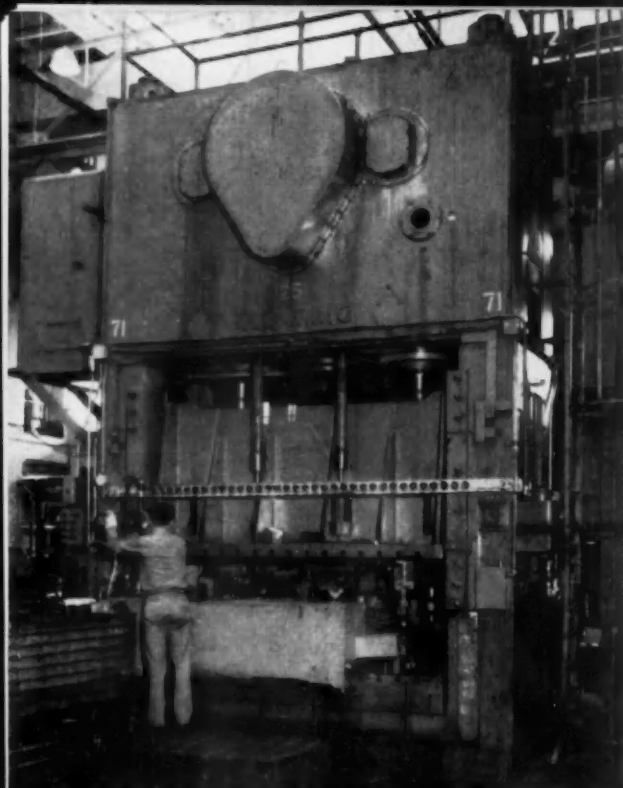
auto mechanics in vocational schools; and to determine, through research, the qualities and aptitudes that make a good candidate for mechanic training.

To meet the first goal, scholarship programs have been set up at Wayne State University (Detroit) and the University of Illinois for teacher training.

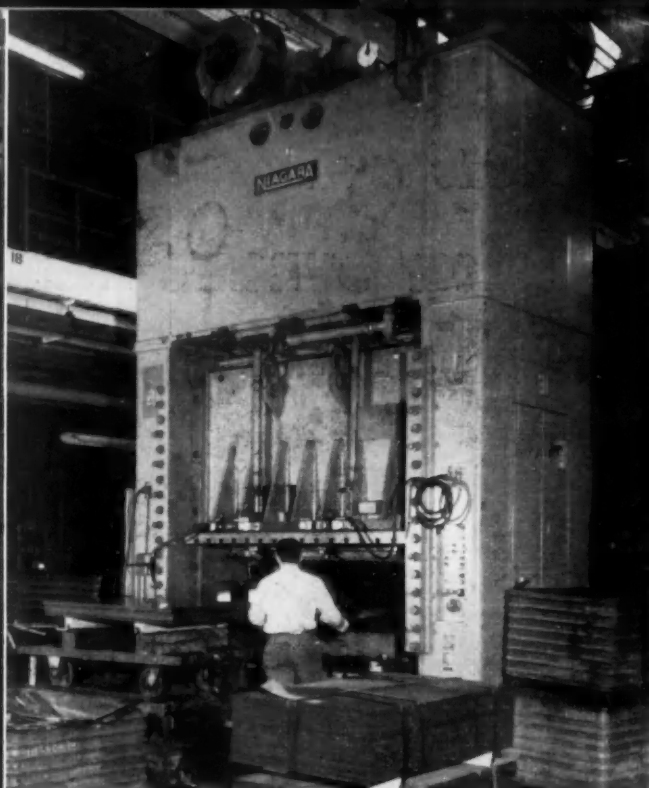
To meet the second goal, the Uni-

versity of Michigan has been granted funds for a seven-year research program.

In announcing the program, AMA managing director Harry A. Williams cited the need for properly trained automobile mechanics. Between 55,000 and 60,000 new mechanics will be needed every year during the next decade to return to the 1950 ratio of one mechanic per 73 motor vehicles.



Pictured is the multiple stage 1000 ton Clearing transfer press for forming the banjo halves of the rear axle. Notice the operator with both hands on the "trip" buttons while the press is in motion.



Rear axle blanks are stamped in this operation in a 600-ton Niagara press. Four to five blanks are produced from one sheet of steel.

More Than 200 Presses in Cadillac's Plant 4

**Sheet Metal Parts and Rear Axle Housings
Produced in Re-Equipped Plant of About
1 Million Sq Ft Area**

By Joseph Geschelin

FRUITION of a project that had its inception early in 1956 now is known as Plant 4 of the Cadillac Motor Car Division. Plant 4, Cadillac's new press shop, has been installed in buildings formerly used by Hudson, located near Gratiot and Conner on Detroit's

east side, with a productive floor space of about 1-million sq ft. Rehabilitation of the old and pretty well run-down plant to modern standards of housekeeping and arrangement, installation of a new and modern power house and other facilities, as well as the moving of

heavy press equipment from the main plant, constituted one of the biggest and most complicated moves in industrial history.

In the process Cadillac moved its entire press shop operation, together with the fabrication of rear axle housings, as well as the screw machine department, to this plant. This released valuable floor space at the main plant, permitting the establishment of the new transfer machine lines for cylinder blocks and cylinder heads described in a recent issue (*see AI, Dec. 15, 1957.*)

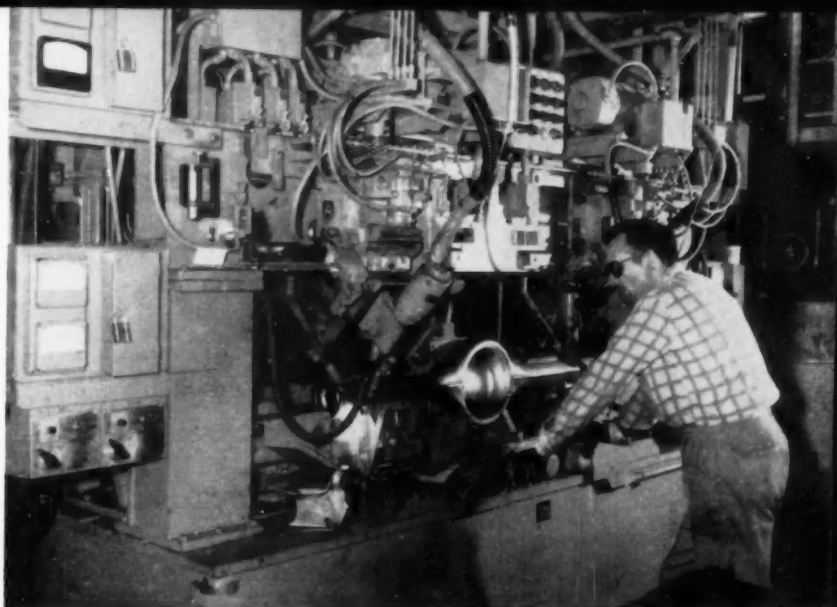
The new press shop contains some 141 presses moved from the main plant, plus 64 new presses of various types, sizes and makes. Among the major items produced here are the following: front fenders, hoods and hood inner panels, bumper sections, rear axle housing stampings and fabrication, stainless steel and aluminum decorative parts and moldings, and variety of small stampings and chassis parts.

Operations on

REAR AXLE HOUSINGS

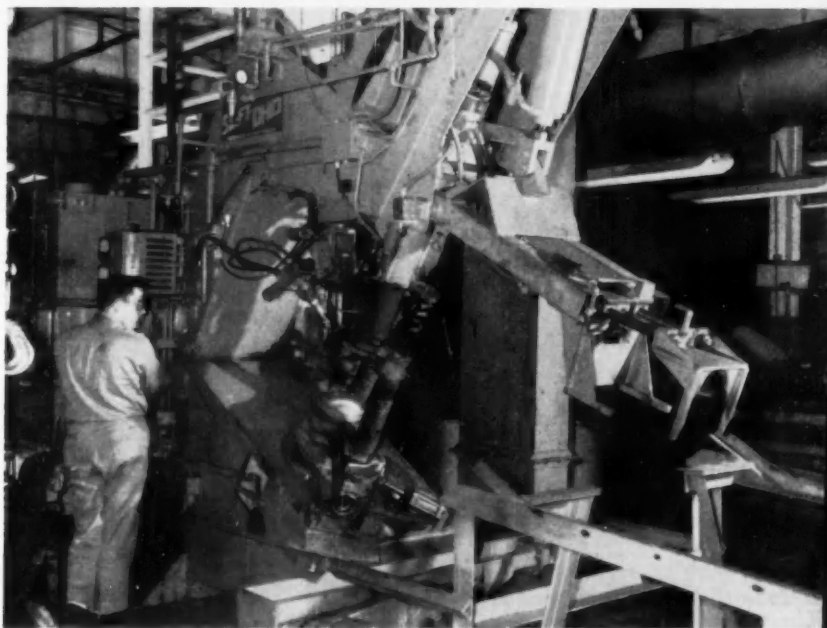
—TOP

After the rear axle housing has been seam welded the heavy spring seat brackets are welded on each side of the housing. This is the Agnew automatic welding machine.



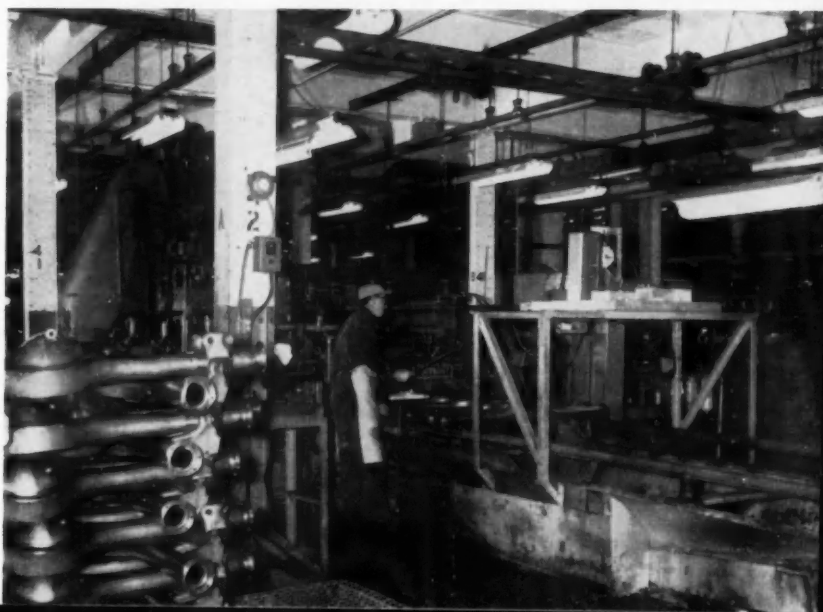
—MIDDLE

A Swift-Ohio welder is utilized to seam weld the rear bracket onto the cover area of the rear axle housing. The majority of welding machines at Cadillac employ the Lincoln weld hidden arc technique.



—BOTTOM

Machining of the rear axle on a Footburt transfer machine. Retooling of the Footburt is all that is necessary for a change of Cadillac models.



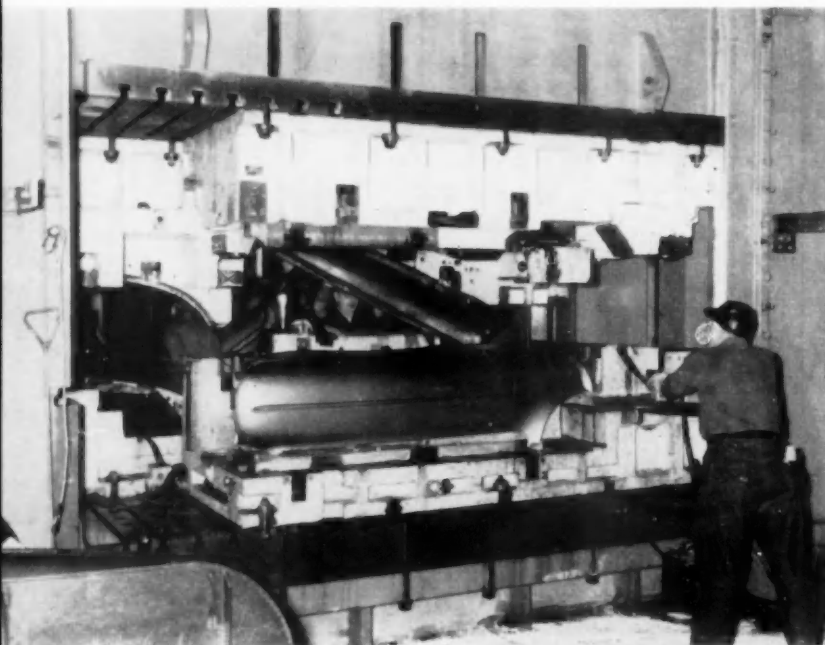
To make these stampings the plant employs NAX steel for bumper sections; stainless steel, aluminum and mild steel; and terne plate for the production of gas tanks. In the production of NAX bumpers sections and mild steel parts alone Cadillac generates nine carloads of scrap per day. The other materials constitute an additional two to three carloads per week.

Since this article is concerned primarily with a sampling of individual operations rather than the details of entire process lines, the presentation will be made in pictorial form, in the main. It is of interest that among the new items of equipment will be found examples of the latest types of presses produced by Clearing, Danly, Verson, Bliss and other makes, in capacities ranging from the towering 1200-ton Clearing and 1250-ton Danly presses to some of the presses of smaller ratings.

Front fenders are stamped in three sections, later welded into a

OPERATIONS ON FRONT FENDERS

single stamping. One of the illustrations shows the flanging of



Front fenders are first stamped in three sections, welded into a single stamping and then re-stamped. Pictured is the flanging operation of the front fenders after welding. It is being performed on an 800 ton Danly press.

front fenders, after welding, in an 800-ton Danly press. The welding of the three sections is done in a group of National welding machines, illustrated here. Welding consists of a series of spot welds, combined with two short seam welds on opposite sides. The job is done in a single setting in each of the welders.

One of the features of front fender stamping production is that the operations are performed along a single line of presses, set up permanently for fender production. This was something that was not feasible in the crowded press shop as it existed in the main plant.

On the hood line Cadillac has an excellent example of modern automatic handling in and out of presses, as illustrated. Here we have shown the 800-ton Clearing press at the head of the hood line. The view taken between this press and the next press in line shows the special horizontally-mounted iron hands for extracting the stamping and loading it onto the shuttle. Near the back side of the next press may be seen the power driven inclined conveyor for transporting scrap from the press bed to a hopper.

We have shown an example of operations on the bumper line; the 1000-ton Bliss trim press.

Coming to the rear axle housing, as illustrated on the two previous pages, we have selected a view of the 600-ton Niagara press which produces the heavy blanks; and the 1000-ton Clearing transfer press for forming the banjo halves.

Rear axle housing fabrication incorporates some interesting examples of advanced techniques. The illustrations cover the following selected examples of welding procedures; seam welding of the heavy spring seat brackets on each side of the housing in Agnew automatic welding machines, and seam welding of the rear bracket onto the cover area in the automatic Swift-Ohio welder. These operations employ the Linconweld hidden arc technique.

Noteworthy example of advanced



Welding of the three sections of the fender is performed on a group of National welding machines. Here we see the operator placing a front fender in the welding machine to join the three sections. The machine is set at an angle for easier manipulation and operation.

practice is the compact installation of the Wean "flying press," illus-

OPERATIONS ON HOOD AND BUMPER

trated here, together with the special Wean coil feeder that serves it. Capable of operating at a rate of 300 strokes per minute, this flying press produces a variety of blanks for small parts, finishes some 30 different stamped parts. Extremely versatile, it requires only a change of dies to switch over from one part to another, thus takes the place of a number of individual presses.

Cadillac too features several installations of fully automatic blanking lines. The larger of the two, illustrated here, consists of the latest type McKay feeder equipment, serving a large Verson blanking press. The equipment is capable of handling coils up to 84-in. in width. As illustrated, the Verson press is served by a McKay coil reel; McKay washer and feeder; and a McKay flex roll unit. The sheet is permitted to drop down into a pit between the feeder and flex roll to provide the slack for the timed interval between press cycles.

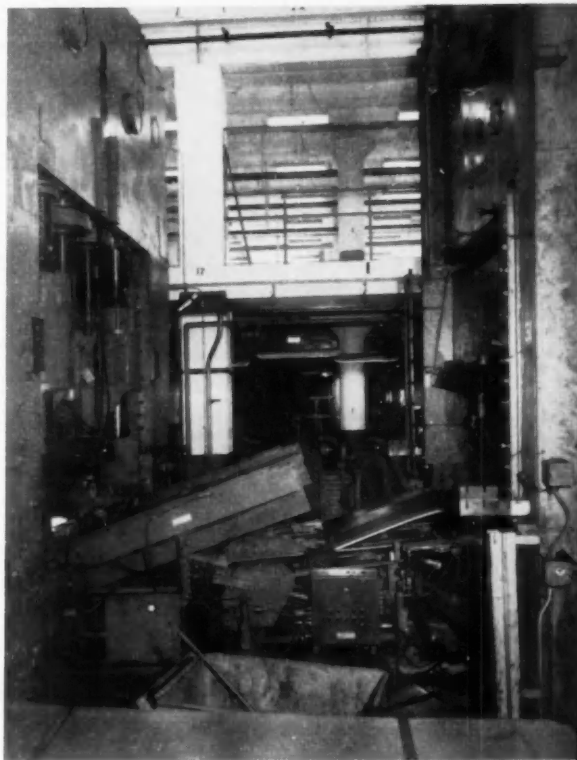
The speed of the feeding mechanism is controlled compatibly with the speed of the press by means of photocells. These cells scan the sheet near the bottom of the pit.

Another blanking line, this one for small blanks, operating on a similar procedure also is illustrated. Here we have a 200-ton Minster press served by feeding mechanism supplied by the Automatic Feed Co. of Napoleon, Ohio.

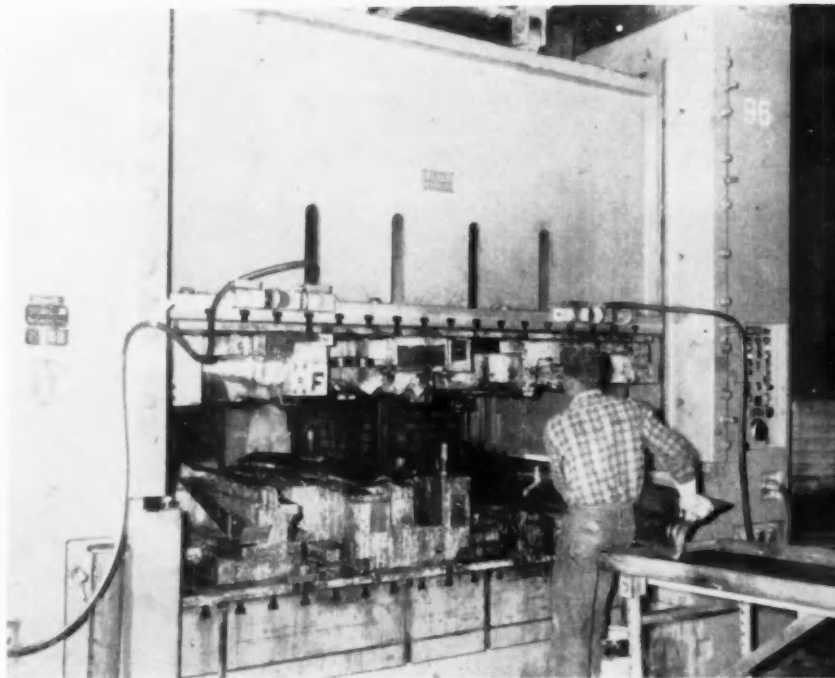
Apart from the screw machine department, the only machining operation of any consequence handled in Plant 4 is that of machining the rear axle housing. This is done in one cycle in the Footburt transfer machine shown here. It was built originally for machining rear axles for 1957 production, then re-tooled for the 1958 rear axle housing.

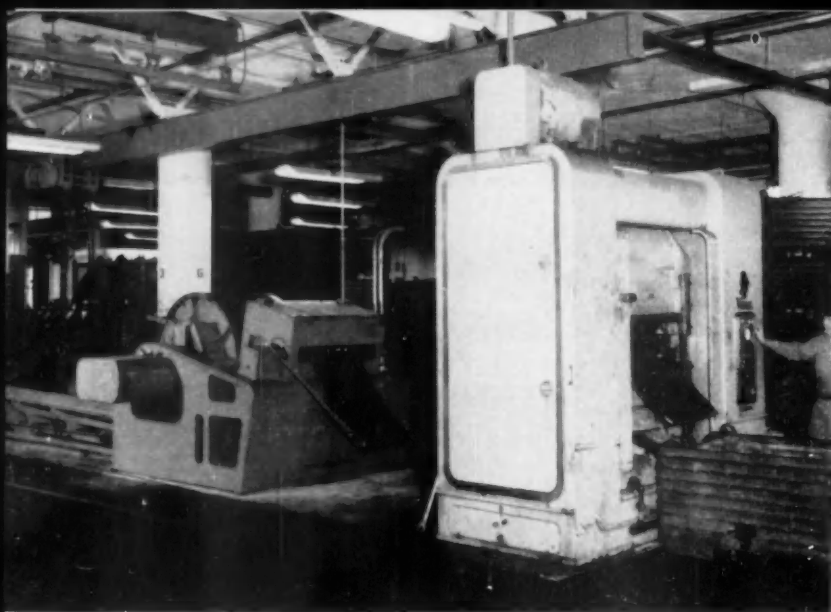
The sequence of operations in the 26-station Footburt which completes the entire job—the machining and drilling of the ends, the machining and drilling of the banjo flange—is given in the table shown on the following page:

Special horizontally-mounted iron hands extract the hood from its first stage in the 800-ton clearing press at the right onto the shuttle leading to the second stage. A power driven inclined conveyor transports scrap from the press bed into a hopper.



Below is the trim operation on the rear bumper section. A three stage trim operation, it is prepared in the 1000 ton Bliss press pictured here.





Feeding at

COIL SHEET

TOP—

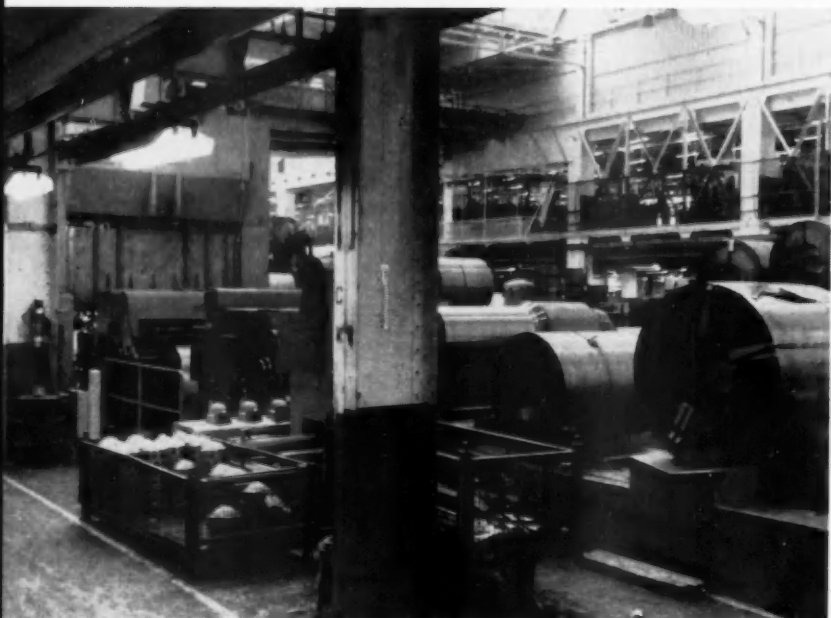
Cadillac's Wean "flying" press is capable of 300 strokes per minute. It is fed by a special Wean coil feeder. The press is extremely versatile and can take the place of many individual presses.

CENTER—

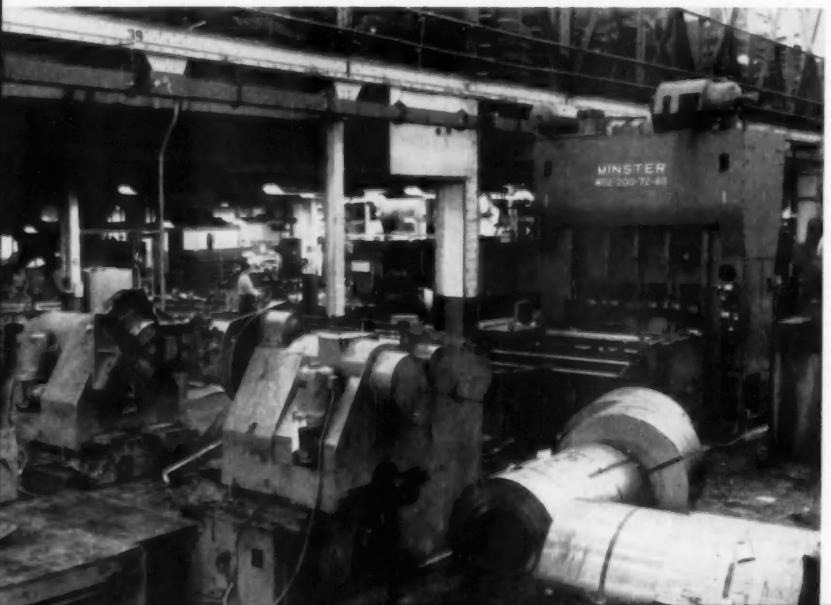
This McKay feeder equipment serves the larger of two Verson automatic blanking presses. Coils weighing up to 25,000 lb are fed by this McKay feeder into the large Verson press.

BOTTOM—

A blanking line for small blanks operates in much the same manner as the Verson and McKay feeder. This is a 200 ton Minister served by a feeding mechanism supplied by the Automatic Feed Co.



Station	Operation
1	Load
2	Face flange on RH side
3	Rough-bore bearing diameter RH side
4	Idle
5	Rough-bore bearing diameter LH side
6	Face flange LH side
7 & 8	Idle
9	Rough—and finish—face banjo surface
10 & 11	Idle
12	Drill and chamfer five holes in both ends
13	Drill 14 holes in banjo and ream five holes in flanges at both ends
14-17	Idle
18	Semi-finish-bore bearing bore at both ends
19-24	Idle
25	Finish-bore bearing diameters at both ends, holding diam- eter to 3.2677-3.2688 in.
26	Unload



Since all metal finishing is done at the main plant, it is necessary to provide for the most efficient and economical means of transporting stampings from Plant 4 to the main plant. To this end, Cadillac has developed special carriers for each type of part, suitable for easy handling in tractor-trailers.

As illustrated here, these carriers are loaded with the parts, then transported to the shipping dock by means of fork trucks. At this point, the carriers are lifted onto a gravity conveyor from which they are readily shunted on to trailers.

THE automobile industry will have to lay out millions of dollars in new plants, new equipment and expansion of existing facilities within the next few years if the industry's productive capacity is to keep ahead of anticipated market growth.

And all the signs point to a healthy increase in the market during the coming year. The rate of car ownership is increasing. Suburbs are burgeoning everywhere, and multiple-car families are a natural by-product of suburban living. The population is expected to increase an estimated 12 per cent just by 1965. Modern superhighways are making motor travel more convenient. The automobile is a proved necessity in our economy, and the public will keep on buying cars at an ever faster pace.

Variable Factors

Long-range predictions of the size of the automobile market in a given year are not easy to make. There are too many variable factors, too many "ifs." The world situation, defense spending, availability of other durable goods, price and appeal of the automotive product, the Federal highway program—these and many other factors can influence the market in either direction.

But it is safe to say that the annual market *will* reach 10 million automobiles, and some experts say this "Year X" could be 1965. Others, more conservative, place the date beyond that.

Of course, it is fairly possible that the industry could produce 10 million cars right now—with a three-shift, seven-day crash program reminiscent of World War II. But such a program would not be economically feasible. For sake of practical analysis, therefore, we must consider that Year X's production will have to be achieved with work schedules comparable to current ones.

High Average Output

Throughout Year X, assembly lines will have to average 200,000 cars a week for 50 weeks. But

Huge Expansion Ahead to Meet Market Growth

**Increasing Population, Multiple-Car Families, and
Modern Superhighways Will Bring Demand for
Automobiles Up to 10 Million per Year**

**By
Hugh Quinn**

that average will be difficult to maintain, since there will be the usual production irregularities brought about by model change-over, vacation and inventory shut-downs, possibly strikes and parts shortages, and other unexpected interruptions. Production may have to go as high as 240,000 or 250,000 some weeks to make up the difference.

The important fact, therefore, is that the assembly plants will have to be geared to turn out *more* than 10 million cars to maintain the 200,000 weekly average.

Current production facilities, however, could not build 250,000, or probably even 200,000 cars in a single week of "normal" schedules. It is difficult to calculate accurately the productive capacity of the industry as a whole, since companies generally regard their individual plant capacities as top-drawer classified information. But this much is certain: the nation's plants were pushing hard throughout 1955, when 7.2 million passenger cars were built. And most plants were pushing hard during the week ended last Nov. 23, when the industry hit a peak production for the year 151,937 automobiles.

Plant Expansions

Assuming that each individual car division would maintain its present percentage share during Year X, we can conclude that many new plants will spring up around the country between now and then to accommodate the greater output,

and many standing plants will be expanded. Of course, there are expansion programs under way now which will add to the industry's capacity, but just how much will depend partly on how the additions are used.

Cadillac

Many of the individual car makers already are straining at the seams just to build enough cars for the current market. Cadillac, for example, is building at the rate of better than 150,000 units a year. To do this Cadillac must work two shifts on all final assembly and manufacturing operations plus additional overtime on sheet metal fabrication. The division's 35-year-old plant in Detroit does not offer possibilities for increasing output to 260,000 cars a year.

Cadillac built 4337 cars the week ended Dec. 15, 1956, for an all-time high. But the plant pulled all stops with six two-shift days. The same forced-draft schedule was necessary for 1955's high week (ended Dec. 23) when 3975 units were produced. And these record-setting performances still fall short of the 5100 weekly average that will be required during Year X, to say nothing of the extra

(Turn to page 132, please)

RETARDER SYSTEMS

for Heavy Vehicles in Europe

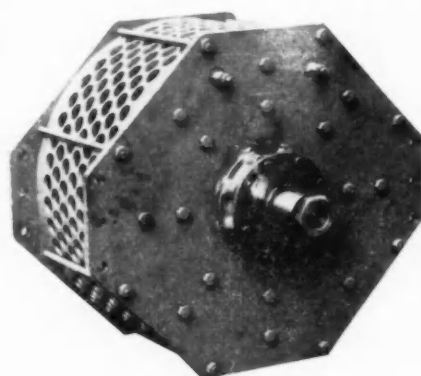
By Robert Braunschweig

DURING the past few years heavy vehicle braking problems have become more and more serious in the mountainous countries of Europe. The increased number of coaches in operation, together with higher cruising speeds, is reflected in a number of accidents which were at least partly due to insufficient braking systems. A similar situation is prevalent as far as heavy commercial vehicles, in particular truck and trailer combinations, are concerned. For these reasons additional braking systems, generally known as retarders, have been given increasing attention by manufacturers, authorities and fleet users. Electric, hydraulic and exhaust brake systems have been improved considerably and can now be relied upon to supplement the

wheel brakes, which thus can cope with emergencies better than before.

In Switzerland exhaust brakes have been used consistently for the last two or three decades in all Swiss-made and many imported heavy transport vehicles, although legal requirements are only now being contemplated seriously.

In France coaches with a gross vehicle weight exceeding 8 tons and trucks of more than 16 tons gross weight have been required to have two independent brake systems for a long time. In July, 1954, however, new regulations were issued to the effect that coaches with a gross weight of over 8 tons and which travel over certain roads in the mountainous "départements" have to be equipped with a third braking system, a retarder, which must be of an approved type. This must be capable, in conjunction with the engine and transmission line used for braking, of keeping the vehicle speed with a full load between 18 and 25 mph on a steady slope of eight per cent on a straight road irrespective of its length. Retarders in the transmission line must be able to maintain vehicle speed so that a gear can be selected, even from neutral, which will restrain vehicle speed to the same value. These conditions apply to all roads situated in the mountainous parts of France on which, over a length of less than 10 kilometers (6.2 miles) there is a total level difference of more than 250 meters. Gradients of under three per cent are not taken into account, and the altitude difference of those between three and six per cent is halved. The whole southern and



Jourdain-Monneret
retarder

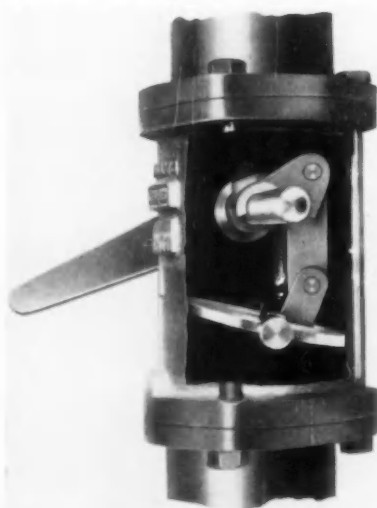
eastern part of France and some other regions are affected.

In Germany, new regulations became effective January 1, 1958. These require that all passenger transport vehicles with a gross weight of over 5.5 tons and all trucks and/or trailers with a gross vehicle weight of over 9 tons and capable of speeds over 12.5 mph must be fitted, in addition to the already prescribed braking system, with an engine brake.

Practical Experiences

From Switzerland practical experiences over a large number of years, and with thousands of vehicles, is available. This indicates that a braking system additional to the road wheel brakes not only increases overall safety, but has other advantages. The braking or retarding force is in most cases a function of vehicle speed, which prevents the wheels from locking when road adhesion suddenly decreases. This has been proved particularly important with trailer trains on fast autobahnen, where it frequently happens that downward gradients are situated in wooded parts and thus particularly subject to a coating of ice in winter. A driver used to either an electric or hydraulic retarder, or an engine brake, will relatively seldom employ his road brakes. These retarders not only remain cool on long downhill slopes and are always

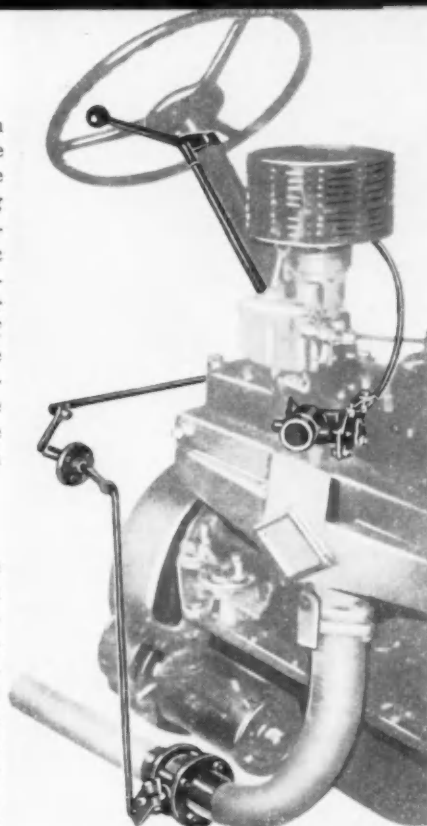
Oetiker butterfly valve engine brake



available for full retardation in an emergency, but in addition brake lining wear is much reduced, the life for one set of linings attaining up to three times the normal mileage. Above all, however, traffic safety is increased, since it is impossible for a vehicle to gather speed on a downhill and go out of control either through brake fade or the inability of the driver to engage a suitable lower gear. France grants a reduction on insurance premiums to vehicles fitted with retarders.

Eddy Current Retarders

The eddy current retarder, the principle of which has been known for many years, is popular for auxiliary braking systems only inasmuch as it cannot be used for actually bringing the vehicle speed down to zero. It is subject to the basic braking problem, which consists in the conversion of the vehicle kinetic energy into heat and, which usually proves more difficult, the dissipation of that heat into the atmosphere. Eddy current retarders have for quite some time been manufactured in France. One of the best-known products is the Telma ralentisseur, of which a new version with improved heat dissipation, the C series, has recently been introduced. With the added cooling it is possible to use the retarder for most braking action even in city driving. Over 10,000 Telma units are in operation in France and Switzerland, and 80 per cent of all



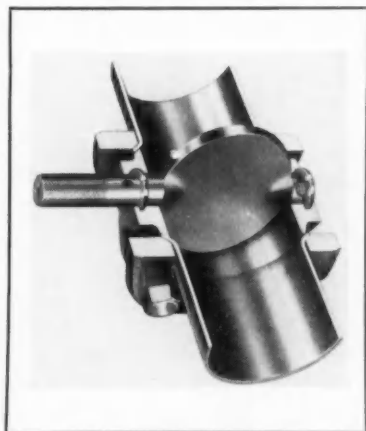
Mechanical linkage for ADE-Haller engine brake

French coaches are fitted with one of these retarders.

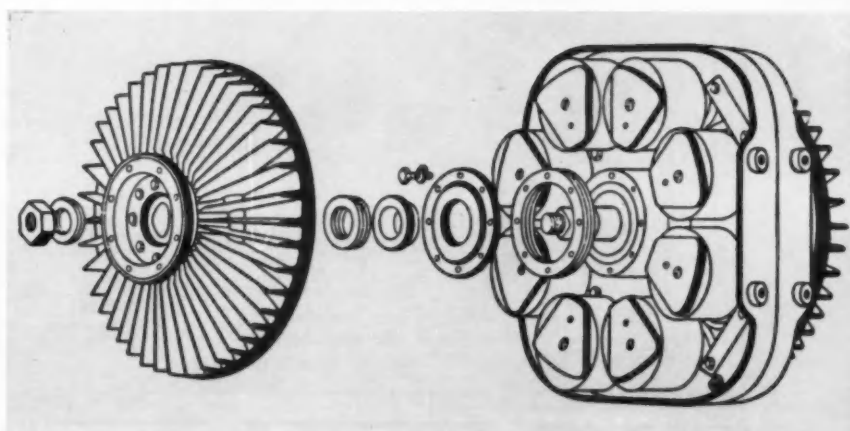
The series C Telma retarder consists of a centrally mounted stator and a two-piece rotor. The stator is formed by two pressed steel dished plates mounted back-to-back on the chassis frame with its axis parallel to the longitudinal vehicle

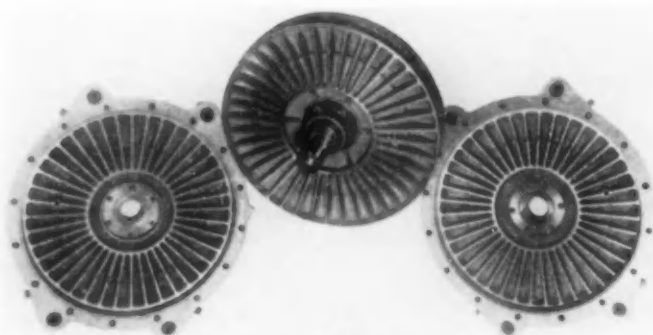
axis, with rubber bushings on its brackets. On each side the stator carries a number of solenoids with their axis parallel to the stator axis. These solenoids are energized for creating the basic electromagnetic field. The two rotor disks are placed on both sides of the stator or solenoid assembly carrier and are mounted on a common hub which is placed in the center of the stator. The rotor disks are equipped with radial cooling fins and with flanges for connection in the transmission line, normally between the gear box and the axle drive. When the vehicle is in motion and the solenoids are energized, eddy currents are induced in the disks which create the braking effect. Kinetic vehicle energy is then converted into heat, which is dissipated in the rotors by radiation and conduction. In former Telma models the rotor was placed within a two-piece stator, but cooling was not then sufficient for heavy retardation. The series C is available in three models, giving maximum braking torques of 580, 870 and 1085 lb ft respectively. Braking torque varies with both the transmission shaft rotational speed and the intensity of the electromagnetic field. The latter can be adjusted by the driver by means of a five-position lever with an off position and four braking positions, in which four independent circuits from the vehicle battery are connected to the solenoids. In the case of failure of one of the circuits the others are still

ADE-Haller butterfly valve

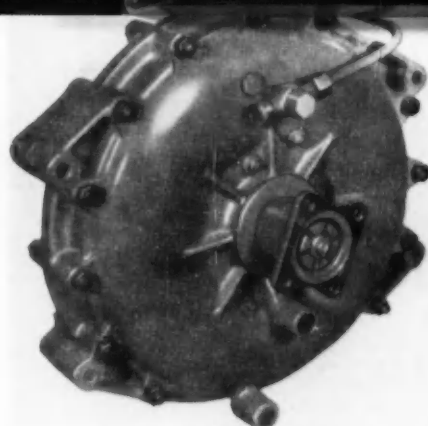


Exploded view of Telma eddy current brake





Elements of the SAMM hydraulic retarder



The SAMM hydraulic retarder

effective, since they are in parallel. By moving the lever through the consecutive position the magnetic field is progressively intensified and braking increased. Operation of the unit is said to be smooth and efficient.

Another eddy current retarder is manufactured by Jourdain-Monneret, partly under Telma license. Maximum braking torque of the FJM 100 unit is 795 lb ft, whereas the smaller FJM 75 gives up to 580 lb ft. In contrast to the Telma retarder the rotor is placed centrally between the two stator plates, each of which carries a series of eight solenoids. Each dished plate forms the outer race for the roller bearings which carry the rotor shaft. A cylindrical cover with perforated holes is bolted to the two stator plates. The rotor is

cooled by an air stream, activated by its vanes, which passes through perforations in the cover. The unit is mounted rigidly in the chassis frame and can be used to form part of an additional cross member. Control is by a lever with four positions, but otherwise similar to the Telma retarder. Weight of the FJM unit is approximately 600 lb.

Exhaust Brakes

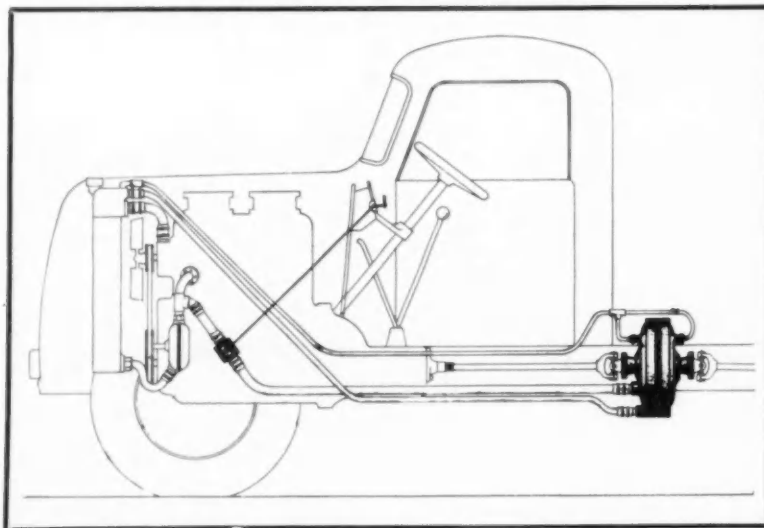
In Switzerland exhaust brake system has been popular for over 40 years. One of the first systems used was the original Saurer engine brake, which featured a special camshaft with a duplicated set of cams with different timing, the brake cams having the effect of converting the engine into an air compressor. A spiral splined sleeve, which was connected with a lever

on the steering column, was used for obtaining the necessary camshaft rotation. This system had several drawbacks and was finally discarded, but it has found its modern and much improved counterpart in the Krupp "Motorkompressor" for a two-stroke type of engine which is described later on.

Most present exhaust brake systems use a butterfly valve in the exhaust system which can be closed, so that the engine functions as a compressor when retardation is required. Brake torque available is, of course, dependent upon engine displacement and rotational speed. When the exhaust is closed, no alterations take place in the induction and compression strokes, as far as inlet air is concerned. In most exhaust brake systems fuel admission is shut off as soon as the exhaust valve is closed. In order to obtain a high compression pressure it is necessary to reduce the air column to the minimum and place the actual butterfly valve close as possible to the exhaust manifold. As soon as the piston approaches the top dead center, depending on the timing of the particular engine, and on valve spring characteristic the inlet valve begins to open and the compressed air partially escapes past the inlet port into the intake manifold. This flow-back reduces the compression pressure and the braking torque available, and expansion into the air cleaner can cause some difficulties if this is of the oil-bath type. It is possible to alter the valve timing and for valve springs, but as a rule this self-regulating effect provides smooth braking and does not inter-

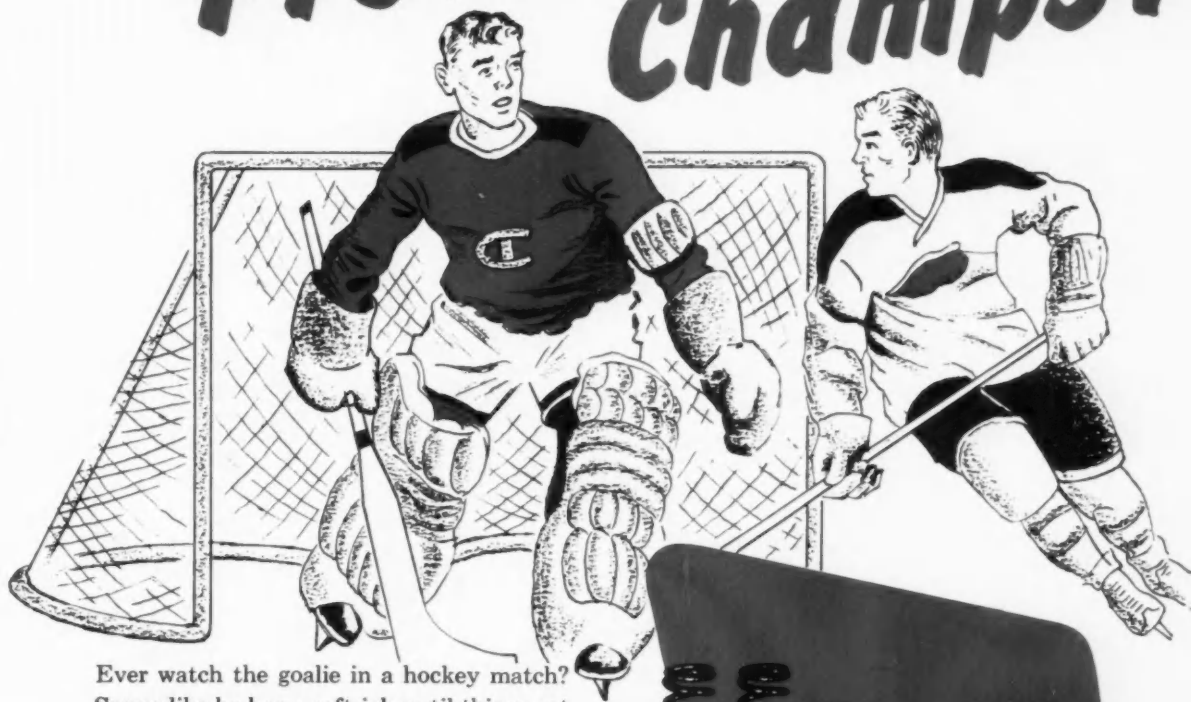
(Turn to page 106, please)

Arrangement of SAMM retarder in vehicle



NOT TOO ROUGH FOR

**Proven
Champs!**



Ever watch the goalie in a hockey match? Seems like he has a soft job until things get rough. But when they do, you know it's no job for an unproven substitute.

Automotive suspension, like the job of goalie, can't be entrusted to unproven substitutes where service is not easily available and heavy tonnage is in the balance. That's why the time-proven dependability of BURTON Springs is so widely relied upon.

Backed by modern equipment and scientifically controlled methods, BURTON experience in spring design and engineering is at your service—ready to help solve your suspension problems.

Whatever your spring requirements, it will pay you to utilize BURTON'S know-how in this specialized field.

BURTON

AUTO SPRING CORP.

... Vital Support for the Automotive Industry ...

Western Avenue at Forty-eighth Street
Chicago 32, Illinois



When you want reliability
... dependability ... specify
Steel Springs. Come to
Burton to get them!



Trucks, buses, trailers, off-highway equipment, and private motor cars of almost every prominent make use Burton Leaf or Coil springs as original equipment.

Ambrose-Augusterfer Corporation
has been awarded the
contract for all major piping
in Torresdale Filter Plant
—now under construction in
N.E. Philadelphia. Pipe being handled
weighs over 10,000 lbs. and
measures 40' by 54" in diameter.



Only Yale G-3 Gas

- ① Wide Angle vision
- ② Fast cycle operation
- ③ Greater load stability

Now full visibility, extra safety and handling speed
for efficient, big-load operations...at low cost

M
bi
fin
fe
Se
W
op
str
—
ing
out
cer

Y
Y
YALE

Raw materials or finished goods
—versatile Yale high-capacity
Gas Trucks handle any type load
with extra speed, safety and efficiency.



s Trucks give you all 3

Maximum visibility, easy maneuverability, high speeds, safe stability—you'll find the combination of all these vital features exclusively in new Yale G-3 Series High-Capacity Gas Trucks.

Wide-Angle Vision—Yale's revolutionary open-front design reduces frontal obstruction. Upright channels are nested—hoisting cylinders wide-spaced—lifting chains located in front of cylinders, out of line of sight. Driver sits high in center—has 300% more visibility!

Fast Cycle Operation—Yale G-3 Gas Trucks maneuver quickly into position...lift capacity loads at speeds up to 60 feet a minute...travel as fast as 20 m.p.h....spot loads accurately. This fast, smooth operation keeps materials on the move, saves time and handling dollars.

Greater Stability—Low center of gravity, broad lifting base, high underclearance, side-thrust rollers, wide channel-roller spacing, large pneumatic tires—these

and many other features that assure load stability are *standard* on Yale High-Capacity Gas Trucks.

Yale G-3 Gas and LP-Gas Trucks come in capacities of 15,000 to 20,000 lbs.—with fully automatic torque transmission, fluid coupling or standard transmission. Complete line available in capacities of 2,000 to 20,000 lbs.

Get the full story. Send for your free copy of Bulletin #3230. The Yale & Towne Mfg. Co., Philadelphia 15, Pa., Dept. A-72.



YALE*

*REG. U. S. PAT. OFF.

INDUSTRIAL LIFT TRUCKS AND HOISTS

YALE & TOWNE

GASOLINE, ELECTRIC, DIESEL & LP-GAS INDUSTRIAL LIFT TRUCKS • WORKSAVERS
WAREHOUSERS • HAND TRUCKS • HAND AND ELECTRIC HOISTS

YALE MATERIALS HANDLING DIVISION, THE YALE & TOWNE MANUFACTURING CO. MANUFACTURING PLANTS: PHILADELPHIA, PA.; SAN LEANDRO, CALIF.; FORREST CITY, ARK.

ANOTHER GREAT PRODUCT OF **AC** ENGINEERING CREATIVITY!

AC *oil filters*

FOR AUTOMATIC TRANSMISSIONS

EUCLID SIX-WHEEL SCRAPER POWERED THROUGH ALLISON TORQUE CONVERTER PROTECTED BY AC OIL FILTER.



Protect delicate, precision-machined parts
from dirt, dust, grit and bits of metal!

CHEVROLET HEAVY-DUTY TRUCK POWERED THROUGH ALLISON AUTOMATIC TRANSMISSION WITH AC OIL FILTER.



Automatic Transmissions meet their supreme challenge from heavy-duty equipment—mammoth off-the-road earth movers and high-tonnage trucks! They operate under extreme conditions of dirt and dust—heat and cold. Yet, their delicate, precision-machined valves and valve arrangements must function perfectly under high pressures and in high temperatures.

AC engineering creativity was enlisted by manu-

facturers to design and produce full-flow Oil Filters expressly for heavy-duty Automatic Transmissions! These AC Oil Filters had to be so efficient that they removed minute particles of foreign matter and still maintained flow rates up to 35 gallons per minute. And they had to conform to the basic design of the Automatic Transmissions.

Oil Filters for Automatic Transmissions prove AC's abilities to design and produce units for clients on schedule. Consult any AC Office about your needs!

AC  THE ELECTRONICS DIVISION OF GENERAL MOTORS

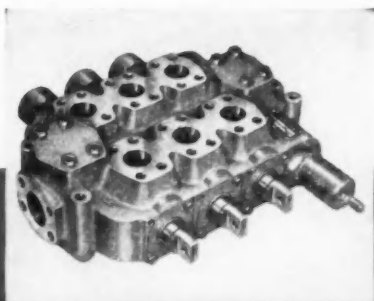


Watch Walt Disney Studios' ZORRO every week on ABC-TV

Save Power on Your Mobile Equipment with—

HYDRECO

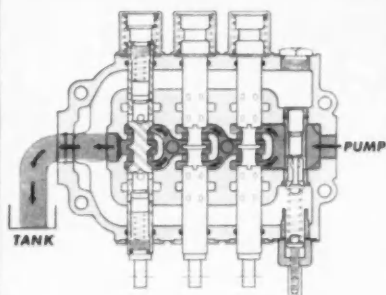
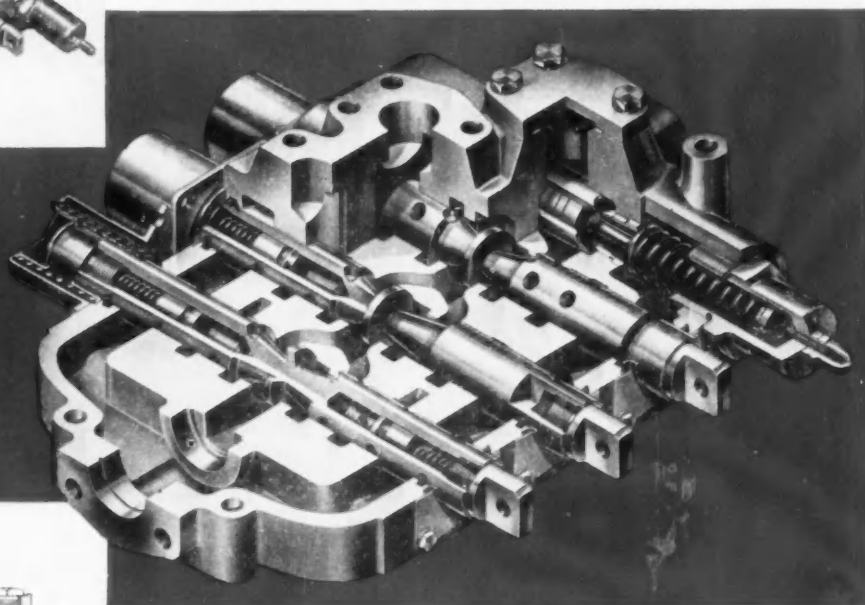
**HOLLOW PLUNGER
FLUID POWER VALVES**



5 to 150 gpm

1 to 6 Plungers

2000 psi



This schematic sketch of the V-26 three-way HYDRECO Valve shows the restriction-free idling flow path of the exclusive HYDRECO Hollow Plunger Valve design.

When you consume fluid power needlessly you suffer not only waste of power, but also excessive heat generation. This multiplies many problems—wear, pump slippage, and deterioration of seals and hydraulic fluid.

HYDRECO Valves are designed with exceptional efficiency to take advantage of this opportunity to economize. They provide an idling flow path around the plungers that is more than ample . . . actually twice normal size. Back pressure during idling is negligible . . . horsepower consumption is therefore less.

This is but one of many significant plus factors in HYDRECO engineering. It also is one of the reasons why the HYDRECO Plunger design gives greater dependability, power-saving control and ease of operation to outstanding earth moving, farm and materials handling applications.

Member NFPA



Write . . .

for detailed information on the full line of HYDRECO Hollow Plunger Valves.

THE NEW YORK AIR BRAKE COMPANY

KALAMAZOO DIVISION • KALAMAZOO, MICHIGAN



Kalamazoo Division
The New York Air Brake Company
9005-2 East Michigan, Kalamazoo, Mich.
Please send me bulletins fully describing
HYDRECO Valves for Mobile Equipment.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____



to meet exacting lubrication standards, specify
ENJAY PARANOX®
detergent-inhibitor additives

When exacting lubrication standards must be met, you can depend on the Enjay Paranox group of highest-quality additives, famous around the world, for the right detergent-inhibitor to blend with every type of base stock.

Enjay has worked extensively with oil companies and leading engine manufacturers to develop lubricating oil additive formulations for military and commercial specifications.

Let us put this experience and know-how to work for *you*. Write, wire or phone the Enjay Company—your only source of a *complete* line of additives (Paramins®) for fuels and lubricants.



*Pioneer in
 Petrochemicals*

ENJAY COMPANY, INC., 15 W. 51st STREET, NEW YORK 19, N. Y. Akron, Boston, Chicago, Detroit, Los Angeles, New Orleans, Tulsa

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Machine Tool Orders Below Expectations

Latest figures compiled by the National Machine Tool Builders' Association disclose that December's net new orders amounted to about \$18.65 million. Total 4th quarter 1957 net new business, based on this preliminary figure for December, are valued at \$74.8 million. This is the lowest volume since 1949's 4th quarter figure of \$64.15 million. The equivalent 4th quarter 1956 figure was \$187.55 million.

The net new order total for the year 1957, covering metal cutting

types only, is now estimated to be \$519.75 million. Recent estimates placed this at \$525 million, anticipating that December results would be better than actually materialized. For comparison, orders booked in 1956 totaled \$924 million.

Shipments of machine tools in December, conversely, were at a higher rate than previously anticipated — the preliminary figure now showing up as \$55.45 million. For the year 1957, the new total amounts to about \$843.2 million—somewhat more than the recent forecast of \$825 million. Billings in 1956, by comparison, totaled \$886.15 million.

Latest Machine Tool Industry Figures on 1957 Operations Indicate Shipments Totaled About \$843 Million and New Orders Amounted to About \$520 Million

The backlog of orders on hand as of January 1, 1958 is currently estimated at three months.

Brown & Sharpe Mfg. Co. Forms Cutting Tool Division

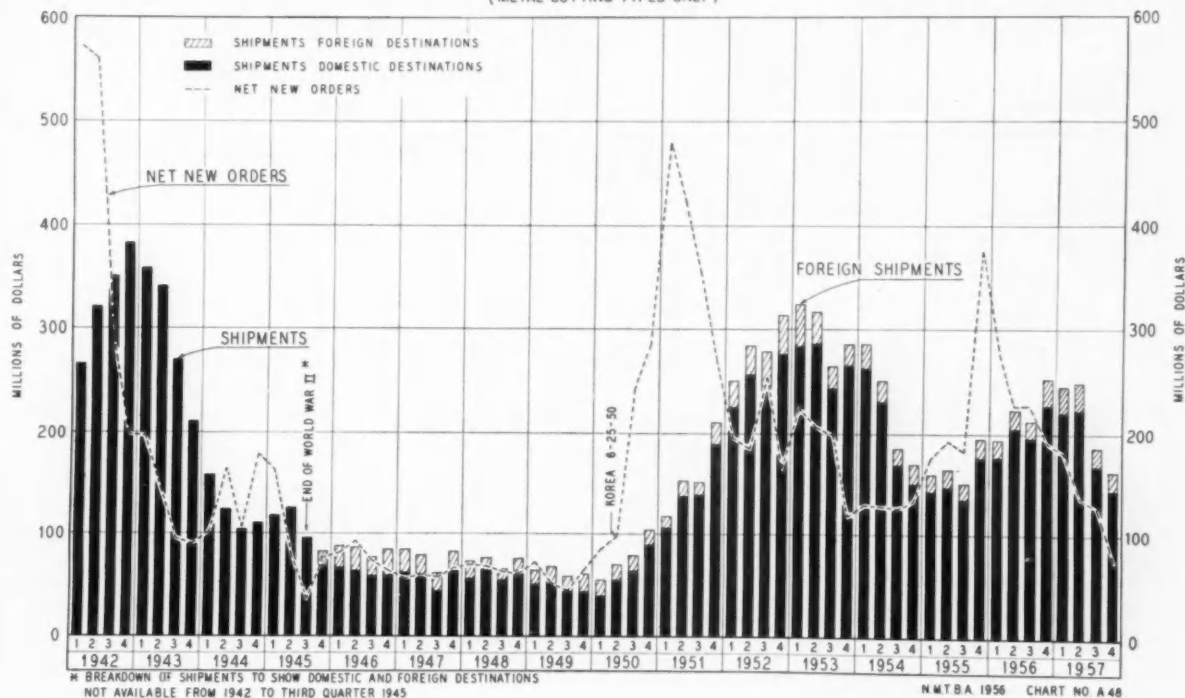
A Cutting Tool Division has been established by Brown & Sharpe Manufacturing Co. and will be under the direction of Thomas Hollis, Jr. as its general manager.

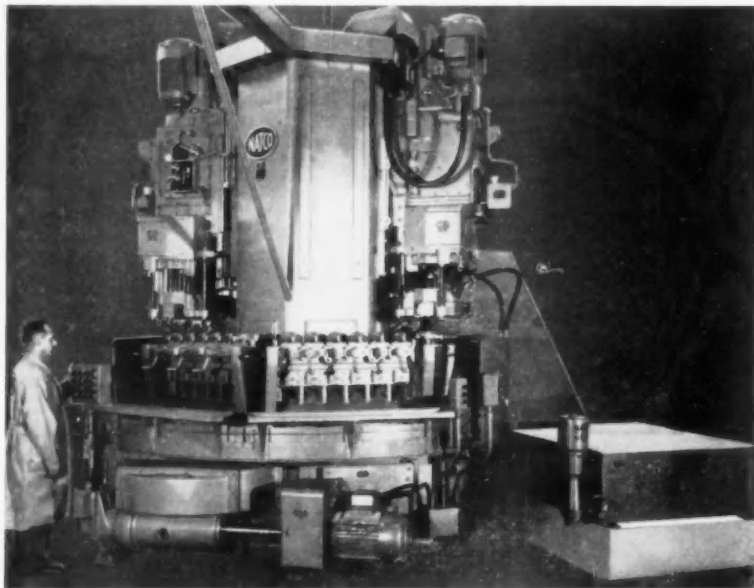
The new division, Brown & Sharpe's fourth, combines in one group the design, manufacture and sale of both high-speed steel and tungsten carbide cutting tools. It

(Turn to page 135, please)

QUARTERLY SHIPMENTS AND NET NEW ORDERS OF MACHINE TOOLS

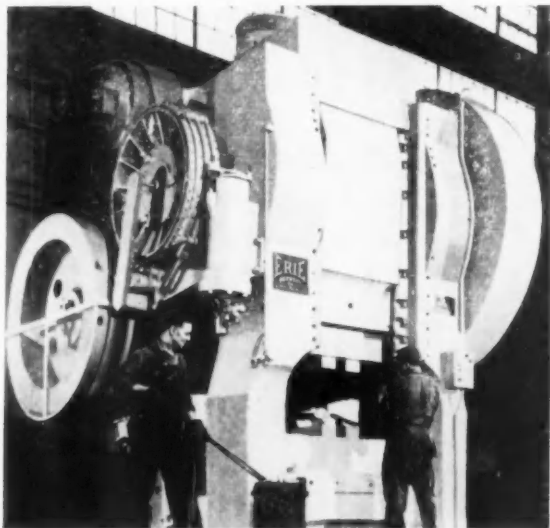
(METAL CUTTING TYPES ONLY)



NEW**PRODUCTION
and PLANT****EQUIPMENT***FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89***435 Connecting Rods Per Hour Produced on Two Center Column Machines***National center column machines work in series and hold six parts in each position*

APPROXIMATELY 435 forged steel connecting rods per hour can be produced on two 100 in. diameter, six-position center column machines that work in series and are arranged to hold six parts in each position.

After the piston pin holes are processed on the first machine, the parts are sawed in another operation to produce rods and caps. In the second center column machine, the two holes for attaching the caps to the rods are drilled, chamfered and reamed for a later threading of the screw holes. In this second machine the parts are loaded vertically in the fixture, locating on the reamed piston pin holes in position No. 1. In position No. 2 the two holes are drilled halfway through. In position No. 3 these holes are drilled through and in position No. 4 the two holes are chamfered. In position No. 5 a two-diameter finish ream hole is made. *National Automatic Tool Co., Inc.*

Circle 30 on postcard for more data

Erie Foundry Co. has mounted the air-operated, two-plate clutch on the main shaft within the main gear, on this 2500-ton mechanical forging press. Bearings are mounted behind the clutch plate. The cover, piston and springs can be removed as a unit, making the inspection of the clutch lining a simple operation

2500-Ton Mechanical Forging Press

ERIE Foundry Co. has designed a mechanical forging press that is said to provide greater clearance for

manipulating the work in and out of the die. This was accomplished by spreading the front columns and mov-

ing the working area forward.

Overall press height is 11 ft, 3 in. A scotch yoke or sliding block is used to transmit pressure from the eccentric shaft to the ram. This device also provides a large bearing area, increases the rigidity of the press, and eliminates the need for the pitman and ram pin. Circulating flood lubrication is provided for the main bearings, and the sliding block is operated in an oil bath. Herringbone design was used in the main gear and pinion which are made of heat treated alloy steel. The brake is adjustable from the floor and the cast-steel brake band, with bolted-in lining, is hinged and reversible.

*Circle 31 on postcard for more data***Redesigned Air Tool**

NOISELESS and blastless operation is featured on a series of portable air tools, such as light and medium

type drills, screwdrivers and tappers. This is accomplished through a redesigned exhaust system and a porous bronze diffuser.

The exhaust air is routed back through a system roughly parallel to the inlet system, and escapes at a



Aro noiseless, blastless air tool

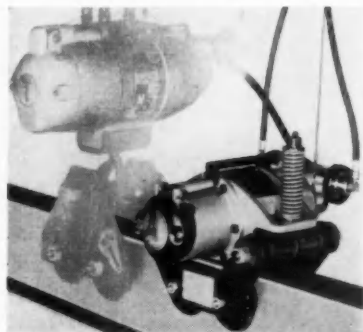
point adjacent to the air inlet. A porous bronze diffuser, located at the outlet, deadens any remaining exhaust noise and dissipates the escaping air evenly in all directions.

The diffuser may be replaced by an exhaust deflector of the same size in cases where it is desirable to concentrate exhaust air in a single direction. The diffuser may also be replaced by a standard air hose of any length, for venting air at a point well removed from the operator. The basic design principle is to counteract shrill exhaust noise within the motor, before it reaches the outlet. The porous diffuser then serves to dissipate all velocity and cancel out any remaining noise. *Aro Equipment Corp.*

Circle 32 on postcard for more data

Powered Hoist Trolley

POWERED by an axial-piston type air motor, the "Hoistractor" exerts a 250 lb drawbar pull on a beam through a rugged spring-loaded neoprene drive wheel. It will pull a two-ton load at 70 ft per minute. Speed can be varied from a slow creep to



Gardner-Denver air-operated Hoistractor

the full speed of 150 ft per minute.

The device fits most standard beams. It is easily adjusted to permit mounting on 4-in., 7.7 lb to 18 in., 54.7 lb I-beams. It can also be adapted to operate on other types of track. *Gardner-Denver Co.*

Circle 33 on postcard for more data

Barrel Finishing System

BASED on a machine called a "Vibraslide," a barrel finishing system combines the principles of rotation and vibration to produce rapid results during cut-down cycles; and can use either principle alone.

The machine resembles a standard octagonal barrel, except that the frame is larger to accommodate the vibratory system. The entire power pack can be slipped out from the frame for maintenance without dismantling the barrel. Other components are standard.

The vibratory barrel will operate at rotating speeds from 4 to 20 rpm. Speed of the vibrator is fixed at 2300

cycles per minute, and both ends of the barrel are synchronized with timing belts so that vibration is uniform. The entire mechanism is rubber mounted.

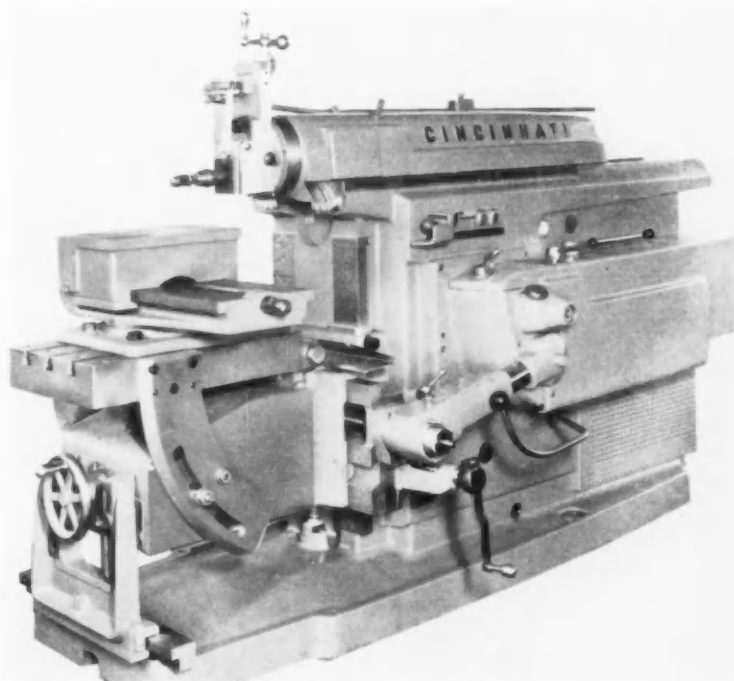
In application, truss rings formally requiring 40 hours for barrel finishing are said to be processed in this machine in two hours with finishes comparable to those produced by the slower cycle. *Minnesota Mining and Mfg. Co.*

Circle 34 on postcard for more data

Wire Forming Machine

DESIGN features of the Model 00 Automatic 4-Slide Wire Forming Machine include a "flip top" vertical swing bed which permits raising of the machine to vertical positions for tooling, adjustment and maintenance. When in operation the horizontal position is used. The machines provide feed length up to 4 1/4 in. with ample tooling areas at each position. *The Baird Machine Co.*

Circle 35 on postcard for more data

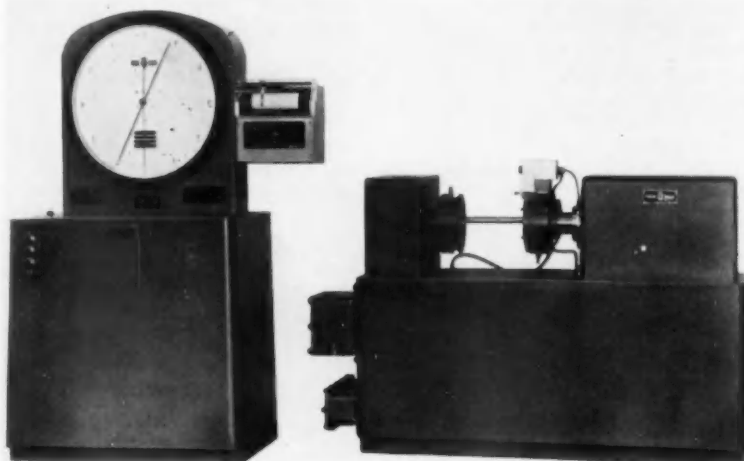


Rigid Shaper Equipped for Machining Glass Moulds

Pictured is a Cincinnati rigid shaper equipped for machining glass moulds. The table may be tilted up or down, and is easily relocated in a true horizontal position by means of a removable locking dowel. The vise has 5 by 15 in. long jaws. Horizontal and vertical power rapid traverse are provided to shorten set up time. *(The Cincinnati Shaper Co.)*

Circle 36 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT



Tinius Olsen remote control torsion testing machine with electronic recorder

Remote Control Torsion Testing Machine

A REMOTE control torsion testing machine has been developed for testing dangerous materials. The loading and indicating units are completely separate and may be located at any distance from each other. The only connection is electrical wiring.

Torque is applied and indicated in both directions of rotation. In operation, it continuously applies a predetermined twist and reverses itself automatically, using one set of grips.

A light on the control panel shows in which direction the load is being applied.

The applied torque load is indicated directly in in.-lb on the 28-in. illuminated dial. Torque is applied to the specimen by means of an electro-mechanical loading system which assures positive testing speeds, as selected by the operator. *Tinius Olsen Testing Machine Co.*

Circle 37 on postcard for more data

brazing, annealing, and hardening of stainless steel, tool, and carbon steels without oxidation or discoloration.

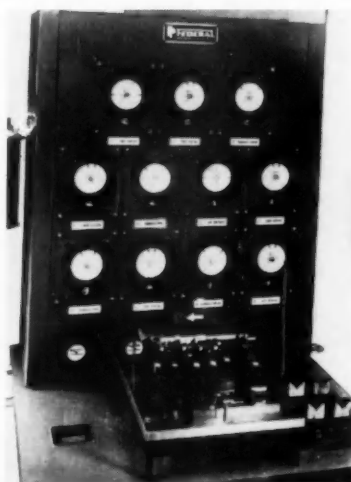
Work is heated and cooled in the full-muffle, pusher-type furnaces within a nonoxidizing hydrogen atmosphere. This unit dissociates the raw ammonia before it enters the heating chamber. After the work leaves the heating chamber, it enters a water-jacketed cooling area. When it leaves the furnace it is cool enough to touch.

Furnaces are built for maximum operating temperatures of 2100 F. Other types of muffles are available for temperatures of 2300 F. In the unit shown, work is pushed through the system manually; however, power pushers are available. *Eclipse Fuel Engineering Co.*

Circle 38 on postcard for more data

Air-Electric Units

MEASUREMENT of multiple dimensions can be accomplished by the

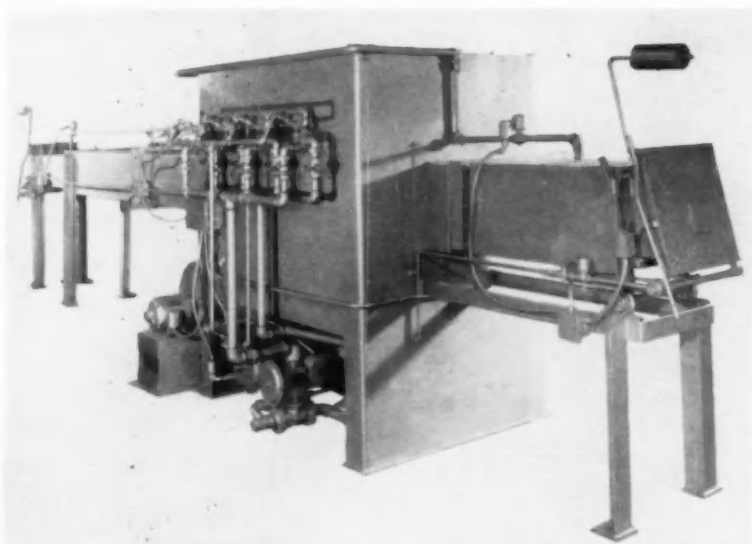


Federal air-electric meter switch

use of a modular air-electric meter switch named Model EAS-1058. When several of the units are arranged for measuring multiple dimensions simultaneously, they are arranged so that the operator need observe one signal light switch which, when on, indicates that all dimensions are within tolerance.

Each of the individual meter units contained in the gage is equipped with two lights which signal an off-size dimension, red for scrap, yellow for salvage. By glancing at the meter hand, the operator can see how much the off-size dimension deviates from tolerance. *Federal Products Corp.*

Circle 39 on postcard for more data



Eclipse large-capacity hydrogen furnace for stainless and high-alloy steels

Large-Capacity Hydrogen Atmosphere Furnace

A LINE of gas-fired hydrogen atmosphere furnaces with heating ele-

ments up to 14 in. wide by 48 in. long by 10 in. high was designed for bright

Powder-Actuated Tool

A POWDER-ACTUATED fastening tool designed to stop an overdriven fastener in its tracks, thus eliminating the danger of firing through a thin work surface is being offered by the Olin Mathieson Chemical Corp.

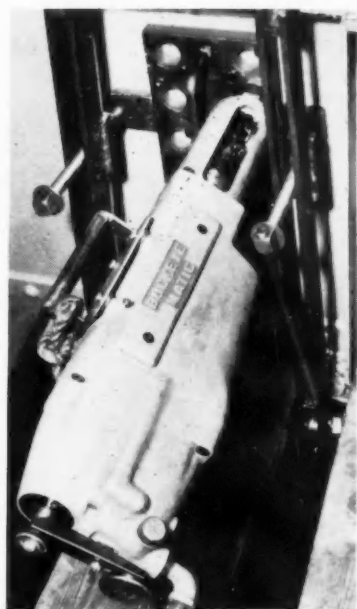
Control of the fastener is accomplished by an assembly whose tapered interceptor jaws prevent the passage of an overpowered fastener or one that encounters a soft or thin spot in the work surface. The fastener is stopped before it leaves the tool. Named the Flite-Chek, the tool seats a special fastener into a variety of non-brittle material at a pull of the trigger. The tool is capable of sinking a fastener into as much as an inch of steel.

Circle 40 on postcard for more data

Mechanical Feed Drill

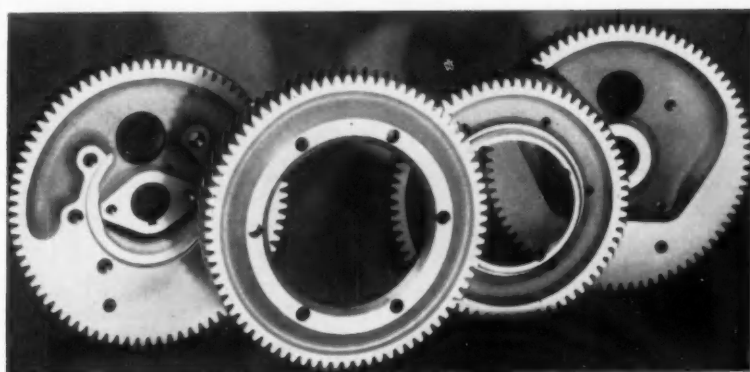
A MECHANICAL feed automatic drill goes through the complete drilling cycle including retraction and stopping automatically. Designed for applications where drilling is done at several points on a large workpiece, it may also be used with permanent fixtures, where work would be brought to the tool.

Rated capacity is 1½ in. in steel,



Buckeye mechanical feed automatic drill

larger in aluminum and softer materials. Maximum stroke can be adjusted downward by a micrometer screw. An overload relief mechanism



Power train gears for Diesel engines made of pearlitic casting material by Central

New Castable Pearlitic Malleable Iron

CLASSIFIED as 88M, the newest range of Armasteel has been developed to fill the automotive industries need for a material having increased strength and wear resistance and at the same time retaining good machining characteristics. Armasteel 88M can be machined and used without further heat treatment thereby eliminating any chance for distortion.

By accurately heating 88M in controlled atmosphere furnaces at 1750 F for approximately 15 hours, all massive carbides are removed. This heat treatment is followed by a rapid air quench from high velocity fans. The material is then reheated and oil

quenched from 1600 F to a narrow range of hardness variation. Tempering is controlled to provide a brinell hardness range of 269-302. It has a tensile strength of 105,000 psi and a minimum yield of 85,000 psi. Minimum elongation in two in. is two per cent.

Carbon spots that are present in the matrix of the Armasteel allow the chips to break off readily, reducing machining time and prolonging tool life. Applications for the new metal include automatic transmission planet carriers, and idler and balance gears on Diesel engines. *Central Foundry Div., General Motors Corp.*

Circle 42 on postcard for more data

automatically starts retraction and shut-off cycle if an obstruction or broken twist drill subjects work spindle to an overload thrust condition.

Named the Buckeye-Matic, the unit is adaptable in drilling, reaming, boring, counterboring and countersinking operations. *Buckeye Tools Corp.*

Circle 41 on postcard for more data

Tapping Accessory

NAMED the Sealol Skilco, this coolant applicator and chip ejector to be used on all types of tapping equipment, both hand fed and automatic, is installed to the tap shank with a set screw.

The tool itself remains stationary as the inner coolant injection ring rotates with the tap. Because the injection holes are always lined up directly with the tap flutes, the lubricant; mist, air or solid, is forced di-

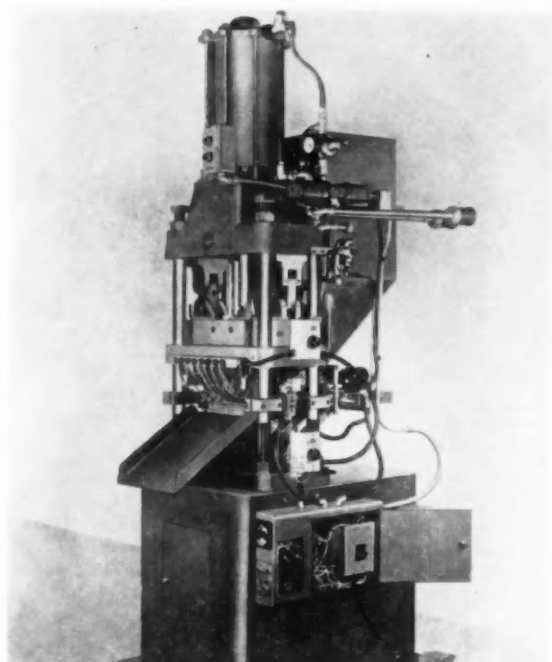
rectly down the flutes. This means that the chips are blown or flushed



Sealol coolant applicator, chip ejector

out continuously and at the same time the tap cutting edges are cooled and lubricated. *Sealol Corp.*

Circle 43 on postcard for more data



Automold high-speed automatic molding unit is made in two models, A50-B and A25-B

Air-Toggle Powered Automatic Molding Machine

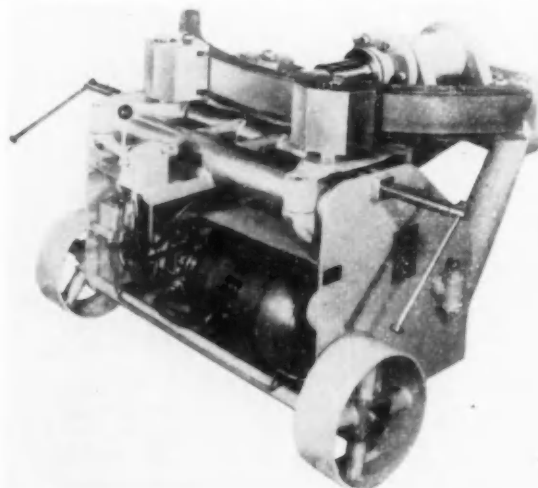
CALLED the Automold and produced in two models, A50-B and A25-B, a high-speed, air-toggle powered automatic molding machine for conventional thermosetting materials and alkyds operates on 100 psi shop air supply. This compression molding machine has many applications in the automobile, appliance and electronic fields. From 25 to 50 tons of pressure is available, depending on the

model.

The machine is of the top ejection type. It operates on a $3\frac{3}{4}$ second cycle with a mechanical advantage of 17:1 provided by the air toggle action. When single-row cavity models are employed, molded parts are mechanically ejected. Parts from multiple rows are ejected by air jets. *Automatic Molding Machine Co.*

Circle 44 on postcard for more data

Hydraulic Ram Action Featured on Bending Machine



This portable ram bender, No. 420, is designed for applications where high production is not required and quick die changes for various sizes of pipe, structurals are necessary. It will bend $\frac{3}{4}$ through 6 in. pipe, I-beams or similar structural shapes. A single valve brings the ram in and out of position. The unit weighs 9700 lb and requires a floor space of 7 ft. 9 in. by 7 ft. 6 in. (Wallace Supplies Mfg. Co.)

Circle 45 on postcard for more data

Internal Thread Former

A TAPPING device known as the X-Press Tap cold forms or swages threads in ductile metals such as aluminum, zinc, brass, lead, copper, and leaded steels. There are no chips to jam or cause loading because the device internally rolls the threads.

The tap cannot be forced into a lead error nor will the part go oversize due to changes in the machine or operator pressure. It is a fluteless tool that has a radial relief to reduce torque and permit free flow of lubrication. Standard tools No. 4 through $\frac{1}{4}$ in. in NC, UNC, and NF, UNF are provided with taper points for easy starting. They are available in two or four threads of taper for bottoming and through holes respectively. Machine screw sizes, 0 through 3, have radial relief only.

Hole sizes must be larger than those shown on conventional tap-drill selection tables because the metal to be threaded is cold formed rather than cut. Those lubricants designed for cold forming or drawing are recommended for use with these taps. *Besly-Wells Corp.*

Circle 46 on postcard for more data

Quick-Change Tool Holders



This is a typical model from a line of quick-change tool holders designed for use with standard MMS tapered tools. Seven models, each in several size ranges, to be used in drilling, reaming, boring, milling and other machining operations are included. (Erickson Tool Co.)

Circle 47 on postcard for more data

Sealing Fastener

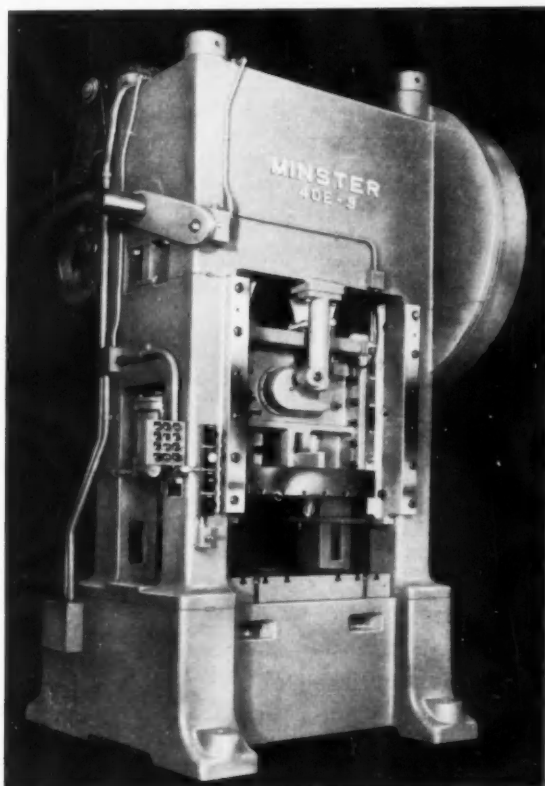
A SECURE triple seal may be obtained on irregular, corrugated or curved surfaces as well as flat surfaces by use of a sealing type fastener named the Spin-Seal. The device consists of a spring type hardened washer with a permanent flowed-in gasket sealant which is preassembled to any type of standard machine screw, cap screw or bolt. The seal is not subjected to twisting and tearing action because the washer does not turn when the screw or bolt is tightened. Spin-Seal fasteners are suitable for auto and truck body assembly.

Service temperatures from -100 to 250 F can be withstood, and on a flat surface with hole clearance of 1/16 in., 2000 psi was withstood. Standard flowed-in compound provides a secure seal against water and many dilute acids. Another compound for oils is available. Both resist salt, sulphur and industrial atmospheres.

The fasteners are supplied in screw sizes from No. 6 to 1/2 in. with washers ranging from 0.560 to 0.920 in. in diameter, 0.025 to 0.040 in. thick and 0.065 to 0.090 in. high. Russell, Burdall & Ward Bolt and Nut Co.

Circle 50 on postcard for more data

Minster heavy-duty blanking press is equipped with a recirculating lubrication system that supplies a constant film of oil on all pressure or bearing surfaces.



Heavy Material Blanking Press, 400-Ton Capacity

MODEL 40E-9, a heavy-duty blanking press, is a 400-ton capacity straight side press designed and built especially for heavy material blanking. It is capable of exerting tremendous force for blanking high shear strength material up to 1/2 in. thick. The standard 40E-9 is a single geared, single end drive press and operates at speeds from 35 to 120 strokes per minute, depending upon length of stroke.

A huge, full eccentric crankshaft

applies force through twin connections. These connections maintain slide parallelism, and distribute forces evenly. Other features include electrically shrunk upper connection tie bolts, large diameter frame tie rods also electrically shrunk for proper preload, large connection screws and slide of rigid design guided by eight bronze lined ways. A wide choice of operating speeds are available. Minster Machine Co.

Circle 48 on postcard for more data

External Mix Spray Guns



Two lightweight spray guns spray all types of paints and fast-drying lacquers and can be used with air compressors rated to 1 hp. Designated Models 35 and 36 they both allow the use of an external mix nozzle set up so that fast drying materials may be sprayed without constant nozzle buildup. (Binks Mfg. Co.)

Circle 51 on postcard for more data

Axial Piston Water Pump

MODEL P917-3, axial piston type 3000 psi water pump was designed for applications requiring a low flow and high pressure, such as actuating landing gear on missiles or aircraft. Intended to pump distilled water, the unit is capable of pumping other corrosive fluids as well as hydraulic and lubricating oils.

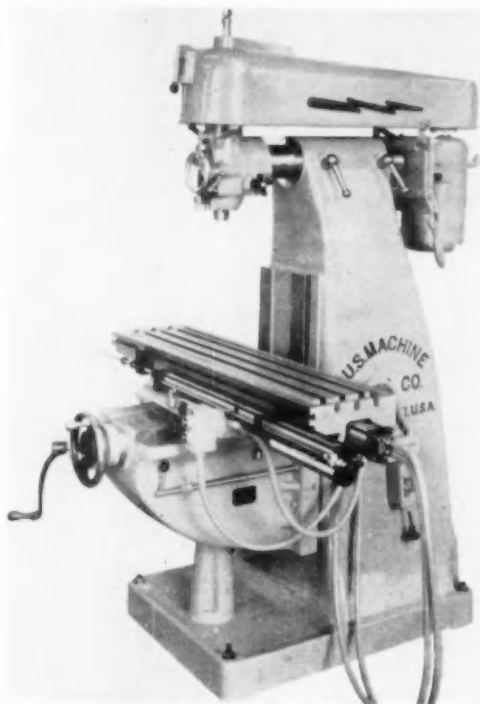
The principle of operation is based on a unit of five axial pistons, located in a stationary block, actuated by a rotating wobbler. The internal

lube pump is a positive displacement, rotary vane type.

The electric motor is 400 cycle, 200 v, 3 phase, 8 pole, 2 1/2 hp at 5400 rpm. At this motor rating the pump has a rated capacity of 1 gpm (minimum) with a 3000 psi discharge pressure pumping distilled water. The duty cycle is one minute "ON" and five minutes "OFF." It will operate in ambient temperatures from 32 to 250 F with fluid temperatures from 60 to 196 F. Lear-Romec Div., Lear, Inc.

Circle 49 on postcard for more data

Vertical Milling Machine With Air-Hydraulic Table Feed



This vertical milling machine is available with air-hydraulic table feed for semi-automatic production use. The unit provides rapid traverse approach, controlled cutting and feed distance, and automatic rapid retraction. The 10 by 30 in. table is equipped with a 30 in. stroke air-hydraulic feed. The air cylinder is mounted in such a manner that the table passes over it during the milling stroke. Range and capacity of the unit are in no way limited by the semi-automatic equipment. A choice of 24 different spindle speeds in a range from 65 to 2850 rpm is offered. (U. S. Burke Machine Tool Div.)

Circle 52 on postcard for more data

to dress proper entrance and exit throats on the grinding wheels.

The first four machines in line are connected to a central coolant system. Because of the finish requirements, the last two machines use a special coolant and are equipped with a combination fabric and magnetic type filter. Each machine has its own continuous automatic gaging device which gages the pieces as they come from the machine. Warning lights flash on if a piece is over or under size. Landis Tool Co.

Circle 53 on postcard for more data

Dovetail Bolts

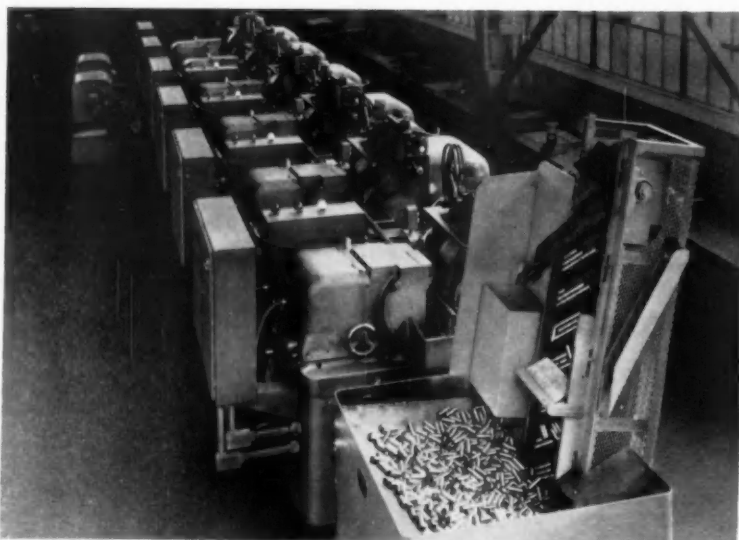
A LINE of dovetail bolts designed for holding gages and stock stops on press brakes and shears have 100 per cent machined heads. Two op-



Jergens dovetail bolts with angled heads

posite sides are tapered dovetail at 30 degree angles. They are made of heat treated metal for tensile strength of 150,000 psi. Jergens Tool Specialty Co.

Circle 54 on postcard for more data



Landis line of centerless grinders automatically finish grinds 2100 parts per hour

Automated Line Grinds 2100 Piston Pins Per Hour

A LINE of six centerless grinders automatically finish grinds 2100 automotive piston pins per hour. These grinders are loaded from an elevator type loader and tooled for

thrufeed operations.

Each machine has different grain and grade wheels to progressively remove less and less stock and to grind better finishes. Profile bars are used

Rectangular Section Seals

A LINE of rubber seals known as Tetraseals fall well within the tolerances set up for standard O-Rings. They are interchangeable with O-Rings, using the same groove, require no special tooling, and on static applications provide a high performance seal. The seals can be fabricated from standard or specially developed compounds of natural, synthetic and silicone rubbers to fill requirements for resistance to temperature extremes, acid and oil resistance, low compression set and other properties. Goshen Rubber Co.

Circle 55 on postcard for more data

Channel Event Recorders

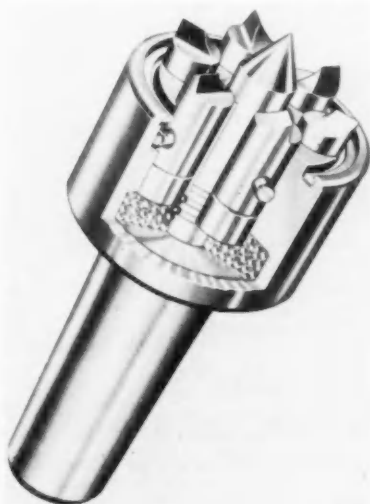
INCLUDED in a line of channel event recorders designed for recording "On-Off" events are 4, 8, 16, 24 and 32 channel models. The portable units consist of standard recorders used in the Sanborn "150" series oscillographic recording systems, but with a four-style Model 189 Multi-marker in place of each conventional galvanometer.

To supply multi-marker coil power, which is approximately one w per coil, a series of transistor amplifiers is used. Input impedance is 3000 ohms minimum, with two v maximum required to supply multi-marker coil power. This is a class B circuit accepting positive going signals only. Rise time of the amplifier and multi-marker combination is approximately 10 milliseconds. *Sanborn Co.*

Circle 56 on postcard for more data

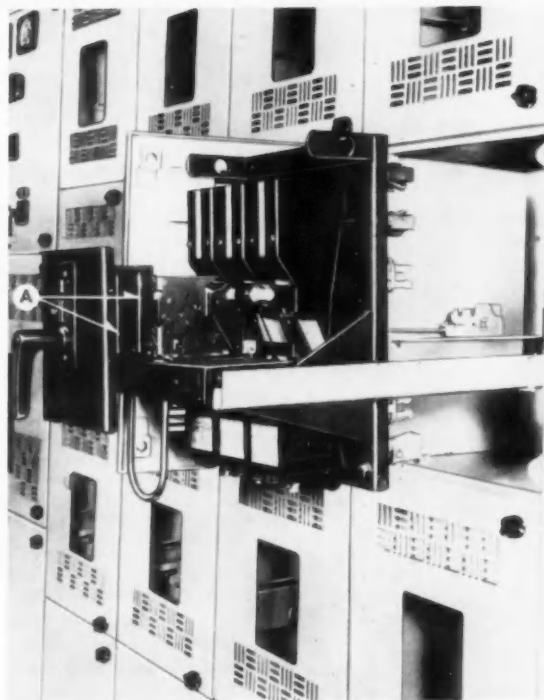
Machine Drive Tool Unit

A MACHINE tool accessory for holding work between centers operates on basic hydraulic and friction principles to grip one end face of the work without the use of chucks, clamps or dogs. The driving action utilizes a circular chamber filled with hardened steel balls, into which the back ends of a group of driving pins are pressed when the driving center is in operation. The balls act as a fluid, distributing pressure equally to all the driving pins and locking them and the centering pin securely when



Ideal driving center, available to fit Morse tapers No. 2 to 6, work diameters from 0.407 to 6.375 in.

Westinghouse Type DB air circuit breaker with three position design provides indication of the breaker position by two white lines on the mechanism. When both lines show, the breaker is in the disconnected position. When one line is visible, the breaker is in the test position. When neither line shows, and the small faceplate is flush with the switchgear door, the breaker is in the connected position.



Air Circuit Breaker With Three Position Design

A NEW, Type DB, 600 v, 15 to 4000 amp, metal enclosed switchgear features three-position breaker design. The interrupting rating of the units are from 15,000 to 100,000 amps. With the circuit breaker in any one of three recognized positions; connected, test, and disconnected, the door of the breaker compartment can be closed. Indication of the breaker position is provided by two white

lines on the mechanism. The three-position feature offers additional safety to operating and maintenance personnel, and greater protection for the circuit breaker. Other features include free aisle space regardless of breaker position, disconnected breakers while maintaining equipment controlled and easy recognition. *Westinghouse Electric Corp.*

Circle 58 on postcard for more data

the driving points have been driven into the work face.

This device, providing a rigid direct drive, functions equally well with uniform work pieces, rough castings, forgings, and uneven shapes and surfaces. Complete end-to-end machining can be done without removing work from the machine and work can be loaded or unloaded without stopping the machine. *Ideal Industries Inc.*

Circle 57 on postcard for more data

Power Transmitter

POWER can be transmitted through any angle desired up to 300 degrees by use of a device called the Geared Joint. This joint is said to be ideal

for making sharp bends. In a typical application, a 120 degree bend had to be made in the steering mechanism just beneath the floor boards of the cab of a new airfield sweeper. Maximum torque that could be applied on the drive would be 1000 lb-in. The geared joint is actually a swivel gear box that transmits power by a system of bevel gears. The 160 size geared joint was used since it has a maximum load of 2000 lb-in. This joint can transmit power at any angle through 300 degrees and is easily installed, just bolt in place. *Stow Mfg. Co.*

Circle 59 on postcard for more data

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**

FASTENING SPECIALTIES BY *National*

Get more dependable holding
power for better product assembly with these
National SPECIALTY FASTENERS!



Lok-Thred® Bolts, Studs, Screws—Seal and lock against involuntary loosening... Lok-Thred re-forms the metal of the receiving thread under high compressive stresses into intimate contact with itself, eliminating all voids. Yet, it's fully re-usable. Requires no selective fits. Can be used with ordinary tools. Available in all sizes of bolts, studs, screws... No. 6 or larger.

Spin-Lock® Fasteners—Give you strength at low cost, with self-locking, ratchet-tooth action... Spin-Lock machine and tapping screws have angled teeth to permit fast, easy tightening. They require about 20% greater torque to loosen. Available in pan, truss, flat and hex heads; slotted or Phillips recessed heads; No. 4 to 3/8" diameters, lengths from twice diameter and up.

Thread Cutting Screws—For joining metals or plastics without tapping... Use wherever it is desirable to remove rather than displace thread material. Four types: 1, 23, 25, and F cover most applications. Phillips or slotted heads, all styles, all sizes. Also type A and B tapping screws for fastening light sheet steel or light gauges of other metals.

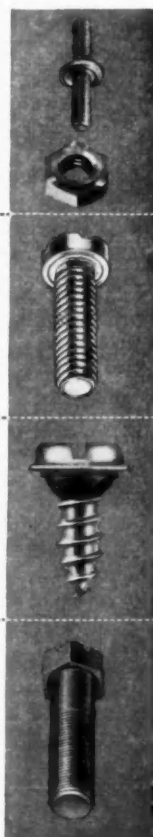
Lock Nuts—Three types, to meet every requirement... 1. *Huglock*, for locking without seating and under adverse conditions. 2. *Marsden*, free-running until seated... for minimum-cost locking. 3. *Drake*, a two-piece design for use under severe stresses, shock, vibration. All types are all-metal, fully re-usable without loss of positive locking action.

Welding Fasteners and Weldnuts—Provide trouble-free assembly of fabricated metal parts... Use National welding fasteners when primary fasteners must be cleanly welded into exact position. National's complete line of projection welding screws and nuts is available in stock sizes, for optimum welds in materials .030 to 1/4" thick. We will develop special designs for you.

Flex-Head® Locking Screws—Self-locking, highly resistant to fatigue, shock, impact... Tight locking results from flexing of the head and axial spring tension produced when fully torqued against a rigid seat. Flex-Head screws are identical in dimension, and interchangeable with standard machine screws. Made of 1022 steel and heat-treated for top strength.

Tuff-Tite® Cushioned Fasteners—Seal openings, eliminate vibration noises, absorb shock... Pre-assembled neoprene washers also prevent finish marring! Available as tapping screws, thread cutting screws, machine screws, roofing bolts, stove bolts, or wood screws; with Phillips or slotted heads; pan, round, truss or hex head styles.

Place® Bolts—Self-locking... resist impact, shock and fatigue failure by controlled spring action of reinforced, diaphragm head... Place bolts resist involuntary loosening when rigidly seated. Typical uses: connecting rod bolts, main bearing cap screws, flywheel bolts. Available in high carbon or alloy steel, in a wide range of sizes.



Save yourself time and trouble in searching for the right fastener. Make National your *one source* for standards, specialties and special designs. Our standard line includes all types and sizes... nuts, cap and set screws, machine bolts, carriage, step and elevator bolts, plow bolts; Phillips recessed head, or slotted, Sems, machine screws, wood screws; stove bolts, pipe plugs, cotter pins and rivets.

National can supply any nonstandard fastener, or design and produce specials for you. Write for National's *Special Products* booklet, or for information on the fastening specialty that interests you.

THE NATIONAL SCREW & MFG. CO. • CLEVELAND 4, OHIO

Pacific Coast: National Screw & Mfg. Co. of Cal. • 3423 South Garfield Ave., Los Angeles 22, Cal.



Fasteners



Hodell Chains



Chester Hoists



Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Metal Finishing 1

Roto-Finish Co. has released a 24 page color catalog on precision metal finishing by mechanical barrel-finishing methods. Included are descriptions of equipment by model number, basic machine dimensions, compartment capacities and recommended work loads.

Hydraulic Data 2

Hydraulic tables and engineering data are contained in 40 page Bulletin 3300. Also a line of presses for applications such as producing laminated plastics, die hobbing, preforming, and plastics and metal-powder compacting are included. *Baldwin-Lima-Hamilton Corp.*

Pneumatic Transducer 3

Catalog sheet 59-100 explains the operation of Pneumatic Transducer, an electro-mechanical device for instantaneously converting 3-15 psi input pressures to ac signals. *Fischer & Porter Co.*

Internal Collet 4

Bulletin EIC-58 describes a collet constructed on a standard 5C collet body and is machinable on the machine. It can also be used in threading or tapping operations where collapsible taps or die-heads are employed. It fits all standard 5C draw bars, fixtures, grinders, etc. *Royal Products.*

Balancing Machines 5

Bulletin 56, 10 pages, describes a line of balancing machines along with their operation and setup for production and short or mixed lot runs. Specification sheets are included. *Tinius Olsen Testing Machine Co.*

Vacuum Metalizing 6

The process of depositing a thin metallic film by evaporation and condensation under high vacuum conditions is fully described in Catalog 780, 21 pages. *F. J. Stokes Corp.*

Gear Catalog 7

Catalog 100, 80 pages, gives information on stock gears, speed reducers, sprockets and chains, flexible couplings, universal joints, collars and pillow blocks. *Charles Bond Co., Gear Div.*

Brazing Small Parts 8

Various applications and characteristics of silver-alloy-brazing are shown in a four page bulletin published by *Handy & Harman.*

New Metal 9

"Ductile Iron Digest," 18 pages, describes a new metal as strong as carbon steel, with tensile strength up to 200,000 psi and as much as 30 per cent elongation. *International Nickel Co.*

(Please turn page)

2/15/50

VOID After Apr. 15, 1958

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

NAME

(Please Print)

TITLE

COMPANY OR BUSINESS

ADDRESS

(No. & STREET)

(CITY)

(ZONE)

(STATE)

FIRST CLASS
Permit No. 36
New York, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

AUTOMOTIVE INDUSTRIES

P. O. Box 66,

Village Station,

New York 14, N. Y.

Readers Service Dept.

AUTOMOTIVE INDUSTRIES

P. O. Box 66,

Village Station,

New York 14, N. Y.

POSTAGE WILL BE PAID BY

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

FIRST CLASS
Permit No. 36
New York, N. Y.

Rotary Shaft Seals 10

The principle of retaining gases, oils or other liquids under pressure is described in a 12 page booklet. Titled "Solving The Problem Of Seals For Rotary Shafts," the booklet contains solutions to typical sealing problems encountered in modern machine design. *Rotary Seal Div., Muskegon Piston Ring Co.*

Relief Valve Catalog 11

Catalog 110 describes a line of adjustable spring-actuated relief valves designed for use in conjunction with a line of positive displacement rotary pumps in complete liquid control systems. Valves are furnished in two models, each available in six sizes, and pressure range is from 5 to 100 psi. *Tuthill Pump Co.*

Modernizing Kits 12

Bulletin 46, 16 pages, lists 42 kits, designed to modernize obsolete presses, such as die cushions to extend press range in draw work, pneumatic-friction clutches to increase production and drive shaft roller bearings. Another kit replaces single end drive with twin drive for longer stroke work. *E. W. Bliss Co.*

Gear Assembly 13

Eight page bulletin CD-575 shows step by step instructions for the assembly of double enveloping worm gearing. The bulletin also shows proper adjustment procedures using no more than a set of feeler gages or a dial indicator. *Cone-Drive Gears, Div. Michigan Tool Co.*

Lift Truck Brochure 16

Using sectionalized views and a system of die-cut pages a 12 page cut-away brochure pictorially disassembles a line of lift trucks to point out their operating features. *The Yale & Towne Mfg. Co.*

Dust Control Filters 17

"Industrial Dust Control," a 36 page catalog, describes a complete line of dust filters and gives complete information about dust control systems and how to engineer them. Operating principles, capacities and dimensions are included. *The W. W. Sly Mfg. Co.*

Rotary Cutting Tools 18

Catalog F-7, 48 pages, lists every type of rotary cutting tool from H. S. Steel to Carbide, Abrasives and Diamonds. Tools are indexed by type, size and machine application. *Pre-ise Products Corp.*

Spin Top Enclosures 19

A six page bulletin covering spin top enclosures for magnetic starters and circuit breakers in hazardous locations has been announced by *Square D Co.*

Valve Catalog 20

Comprehensive characteristics and data to aid in the selection and application of valves rated for water and oil pressures are contained in 56 page catalog, 58-59. The complete line of Shear-Seal valves are described in detail. *Barksdale Valves.*

Drill Grinders 21

Four page bulletin 4400 describes the Sellers 10-G drill grinder for grinding 1 1/4 to 5 in. diameter drills. Design and construction features of the grinder are included. *Consolidated Machine Tool Div., Farrel-Birmingham Co., Inc.*

Mechanical Tubing 22

Data Card TDC-115D furnishes data in detail on the important dimensional tolerances, both cold drawn and hot finished, of round, seamless carbon and alloy steel mechanical tubing in various conditions of heat treating. *The Babcock & Wilcox Co.*

AI Index 14, 15

Check 14 on postcard for index to Vol. 117 (July 1 to Dec. 15, 1957) of AUTOMOTIVE INDUSTRIES. A limited number of copies of the index to Vol. 116 (Jan. 1 to June 15, 1957) are also available. Check 15 if you wish this index also.

USE THIS POSTCARD

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

NAME (Please Print) TITLE

COMPANY OR BUSINESS

ADDRESS

(No. & Street)

(City)

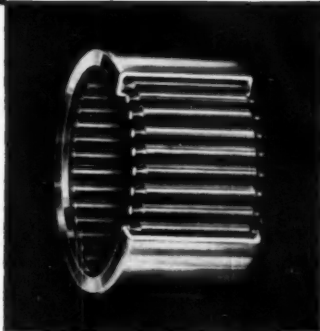
(Zone)

(State)

VOID After Apr. 15, 1958 2/15/58



Torrington Needle Bearings save space, save weight, simplify assembly, reduce maintenance, ease lubrication, reduce friction and reduce cost in the Bolens Ride-a-matic garden tractor, manufactured by Bolens Products Division, Food Machinery and Chemical Corporation.



Needle Bearings keep it trim

Small in scale, big in performance—that's the Bolens Ride-a-matic garden tractor. One of the features that helps trim its weight and size and improve performance is the extensive use of Torrington Needle Bearings in the power train.

Drive shaft, transmission shaft, gear train and chain sprockets all are equipped with Needle Bearings. Their low friction increases power delivery. They provide maximum capacity within the smallest possible cross section for long service life. They retain lubricant effectively, reducing maintenance requirements.

Torrington pioneered the development of Needle Bearings and their application to all kinds of equipment. If you are looking for the advantages of compactness, capacity and low unit and operating costs, talk to your Torrington representative. **The Torrington Company, Torrington, Conn.—and South Bend 21, Ind.**

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada

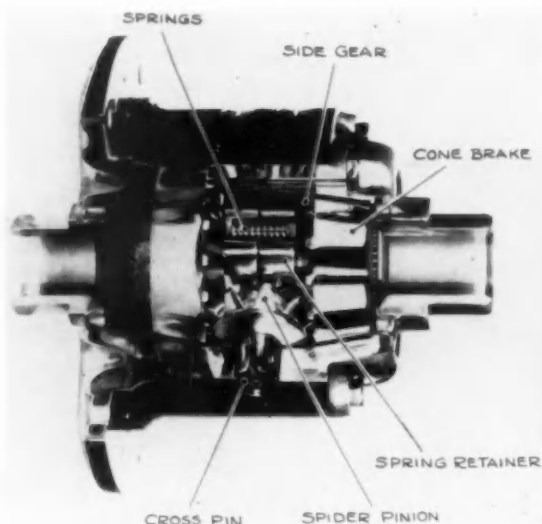
NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS • THRUST

NEW

PRODUCTS

AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89



Borg-Warner spin-resistant automotive differential will not become noisy, develop excessive backlash with wear, cause full locking of one axle shaft or interfere with normal steering. With equal traction at both rear wheels, the unit acts as a conventional differential, delivering equal torque. With unequal traction, the major portion of the driving force is delivered to the wheel with the better traction.

Pre-Loaded, Spin-Resistant Automotive Differential

This spin-resistant automotive differential provides increased traction on snow and ice, enables a motorist to pull out of mud and sand holes, reduces skidding on curves, diminishes swerving on rough crowned roads, and reduces tire wear due to wheel bounce. It is interchangeable with most existing conventional differentials and provides completely automatic operation under all kinds of traction conditions.

Designed for use on passenger cars, trucks, tractors, construction machinery, military vehicles and industrial lift trucks, the unit does not in-

terfere with normal steering, will not become noisy and will not develop excessive backlash with wear.

When one rear wheel has more traction than the other, the unit automatically delivers the major portion of the driving power to the wheel with the greater traction. At the same time, the wheel with the lesser traction is braked through the action of pre-loaded cone brakes and side gear thrust. When traction is equal at the rear wheels, the differential operates as a conventional unit. Borg-Warner Corp.

Circle 60 on postcard for more data

Self-Locking Nut

A miniature clinch type self-locking nut designed with an integral metal cap has been developed to meet the requirements for a part that could be used inside a miniature transformer. During the "potting" operation, some means to prevent the potting compound from flowing inside the threads was needed. For other applications where "potting" is not involved, the

cap can be used to protect closely packed delicate wiring and components from bolt end damage.

The fastener is mounted by expanding the short knurled shank in the installation hole. It then becomes a fixed fastener suitable for applications where space will not permit normal wrenching or where a blind nut is required.

The new ESNA LHCFKM in 4-40,

6-32 and 8-32 threads is designed with a shank length of 0.040 for use in material of 0.030 to 0.050. Nut and cap are of heat and corrosion resistant steel. Elastic Stop Nut Corp. of America.

Circle 61 on postcard for more data

Dry-Type Transformer

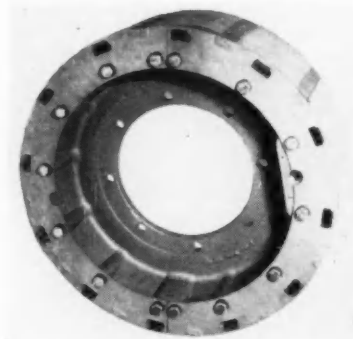
A line of dry-type specialty transformers, Type EP, is suited for application to electrical machinery, panelboards and general commercial installations. The core and coils of the transformers are completely encapsulated in resin with filler, providing a sealed unit that can be installed in hazardous areas.

Available in ratings from ¼ to 10 kva, 600 v and below, they can be mounted in any position on wall, floor or ceiling. Ratings 3 to 10 kva are suitable for outdoor use. All ratings will carry Underwriters Laboratories approval. Westinghouse Electric Corp.

Circle 62 on postcard for more data

Full Circle Brake

A heavy-duty, full circle brake for off-the-road equipment named the "Hi-Torque" is a hydraulic drum type brake with 360 degree expander tube



actuation designed for large tractors, scrapers and earth movers. The brake operates with nearly constant lining pressures at all points around the drum area. The "Hi-Torque" requires no lubrication, eliminates mechanical

shaft or cam alignment problems and can be disassembled with standard hand tools. The brake is bolted as a single unit to the axle or axle housing of the vehicle and uses either the existing air supply or hydraulic power from the central system. *B. F. Goodrich Aviation Products.*

Circle 63 on postcard for more data

Air Line Lubricator

This air line lubricator, called "Pneu-Liner," was designed for air line lubricating applications where few adjustments would be necessary, once the initial setting was established. Pneu-Liner's mist action is said to provide constant lubrication

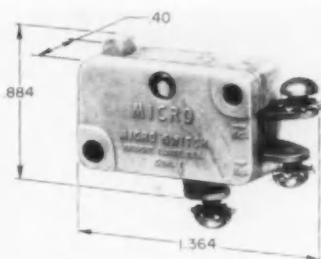


during the entire period of operation; every particle of compressed air traveling along the air line carries some oil along with it, in mist form, for lubricating. The device provides absolute lubrication regardless of frequency of the cycle. Pneu-Liner in the 1/2 in. size can lubricate any amount of air from 3/4 cu ft up to 90 cfm. It is adaptable to either right or left hand mounting without modification. *Gits Bros. Mfg. Co.*

Circle 64 on postcard for more data

High-Temperature Switch

A small precision switch that has a minimum life of 25,000 operations at 600 F is designed for use on jet engines, rocket powered missiles and electronic gear that is subject to large amounts of heat and radiation. The switch, designated V3-1301, has a case, cover and plunger molded



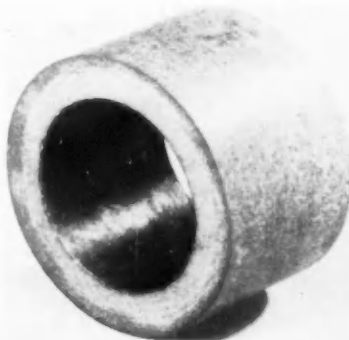
from a special type glass-bonded synthetic mica.

The contact arrangement is single-pole double-throw. It may be wired either normally open or normally closed and has standard screw type terminals. Characteristics include operating force, 6 to 14 oz; release force, 4 oz; pretravel, 0.047 in. maximum; differential travel, 0.006 to 0.016 in.; overtravel, 0.031 in. minimum and weight, 0.017 lb maximum. Electrical rating of the switch is 10 amp at 125 or 250 vac; 1/2 amp at 125 vdc and 1/4 amp at 250 vdc. *Minneapolis-Honeywell Regulator Co.*

Circle 65 on postcard for more data

Engine Mounting Bushing

Designated as U. S. 9526-DI Pyrotex, an engine mounting bushing developed for use in the truck and farm equipment fields features long life due to the non-woven asbestos felt used in its construction. The dimensions of the bushing are 2.972/2.976 in. outside diameter by 2.007/2.012 in.



inside diameter by 1.78/1.84 in. long. Applications generally call for two bushings per unit. *Raybestos-Manhattan, Inc.*

Circle 66 on postcard for more data

Plastic Laminates

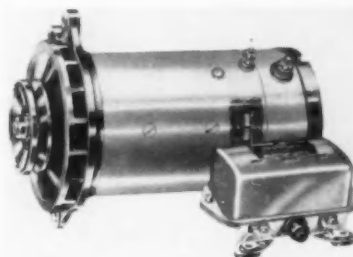
A line of Dilecto flame-retardant plastic laminates having high resistance to heat and flame contains special chemical additives that dampen

and extinguish flames started by electric arcs or other sources. Nine different grades of varying characteristics for a wide range of industrial applications are offered. Among these are the paper base phenolic resin laminates, glass-mat polyester resin laminates and glass-base epoxy resin laminates. These materials are available in a wide range of thicknesses, sheet sizes and tube and rod diameters. *Continental Diamond Fibre Div. of Budd Co.*

Circle 67 on postcard for more data

Automotive Generator

Designated the SSG, a low cut-in generator and its companion regulator the SSR, are both heavy duty



units designed to withstand the severe service found in commercial vehicles. Armature windings are bonded to their slots by a heat resisting plastic and are further supported by fiber-glass bands to improve their ability to withstand high speeds.

The slots between commutator segments are machined to accuracy by an electronically controlled process. Field coils are encased in this special plastic. This is said to provide greater protection against electrical or mechanical breakdown and to permit better dissipation of heat. *American Bosch Div., American Bosch Arma Corp.*

Circle 68 on postcard for more data

Reinforced Retaining Ring

The Truarc Series 5144 reinforced E-ring was designed for use in assemblies in which the ring is subject to strong push-out forces resulting from heavy vibration and shock loads, high rotational speeds or relative rotation between the retained parts. The device has a heavy web section with tapered bending arms which is said to develop substantially greater spring pressure with no increase in permanent set. To further increase gripping power the entrance gap has

(Turn to page 165, please)

• • INDUSTRY STATISTICS • •

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending		Year to Date	
	Feb. 1	Jan. 25	1958	1957
PASSENGER CAR PRODUCTION				
Rambler	3,797	3,483	16,311	6,217*
Total—American Motors	3,797	3,483	16,311	6,217*
Chrysler	917	679	6,281	14,899
De Soto	454	1,489	3,663	17,036
Dodge	1,793	2,683	9,515	29,334
Imperial	209	128	1,870	3,785
Plymouth	6,080	7,600	38,599	65,527
Total—Chrysler Corp.	9,433	12,579	59,928	130,561
Edsel	339	380	1,733	
Ford	26,224	25,013	118,261	159,674
Lincoln	797	991	3,217	6,416
Mercury	524	3,820	12,415	38,465
Total—Ford Motor Company	29,884	30,204	135,626	204,555
Buick	6,663	8,909	36,463	56,996
Cadillac	3,196	3,188	13,459	15,769
Chevrolet	35,045	34,804	151,818	157,917
Oldsmobile	8,961	8,534	40,652	47,468
Pontiac	7,389	6,323	32,474	43,131
Total—General Motors	61,248	59,758	274,866	321,281
Packard		241	428	1,957
Studebaker		1,229	2,247	4,598
Total—Studebaker—Packard Corp.		1,470	2,675	6,555
Checker Cab.	85	72	237	255
Total—Passenger Cars	104,447	107,566	489,643	669,444

* Includes Hudson and Nash.

TRUCK AND BUS PRODUCTION

Chevrolet	5,562	5,665	25,587	34,669
G. M. C.	1,310	1,447	5,805	7,722
Diamond T	124	94	479	386
Divco	60	60	264	365
Dodge and Fargo	1,567	959	4,615	8,119
Ford	5,359	5,110	23,396	25,058
F. W. D.	20	23	127	116
International	2,723	2,688	11,788	10,534
Mack	358	374	1,205	1,740
Studebaker	129	301	804	906
White	406	407	1,754	1,850
Willis	805	1,790	6,429	6,609
Other Trucks	60	60	270	430
Total—Trucks	18,483	18,978	82,523	98,504
Buses	85	95	369	316
Total—Motor Vehicles	123,015	126,639	572,535	768,264

1957 TRUCK TRAILER SHIPMENTS

Type of Trailer	Eleven Months		
	November	1957	1956
Vans			
Insulated and refrigerated	257	4,179	4,898
Steel	47	579	1,026
Aluminum	210	3,600	3,872
Semi-insulated	51	589	N.A.
Steel	51	569	N.A.
Aluminum			N.A.
Furniture	107	1,476	1,996
Steel	107	1,476	1,996
Aluminum			
All other closed-top	1,644	19,335	24,201
Steel	669	8,680	10,641
Aluminum	975	10,655	13,560
Open-top	225	2,944	3,441
Steel	83	1,464	1,580
Aluminum	142	1,480	1,861
Total—Vans	2,284	28,523	34,536
Tanks			
Petroleum	239	3,964	4,992
All other	84	1,326	958
Total—Tanks	323	5,290	5,950
Pole, pipe and logging			
Single axle	15	356	562
Tandem axle	41	581	1,248
Total	56	937	1,810
Platforms			
Racks, livestock and stake	273	2,356	920
Grain bodies	68	1,208	1,647
Flats, all types	396	6,035	7,872
Total—Platform	737	9,599	10,439
Low-bed heavy haulers	145	2,635	2,841
Dump trailers	82	1,833	1,975
All other trailers	236	3,277	2,506
Total—Complete Trailers	3,863	52,094	60,057
Chassis	346	3,958	3,489
Total—Trailers and Chassis	4,209	56,052	63,546

N.A. Not Available. Source: Industry Div., Bureau of the Census.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	November			Eleven Months		Per Cent Change		
		1957	October 1957	November 1956	1957	1956	Nov. over October	Nov. over Nov. 1956	Eleven Months 1957 over 1956
1	New England	21,081	26,202	20,174	295,023	307,864	-19.62	+ 4.40	- 4.17
2	Middle Atlantic	75,166	88,915	72,085	1,052,057	1,032,736	-15.46	+ 4.30	+ 1.87
3	South Atlantic	52,123	60,723	54,891	699,902	713,944	-14.16	- 5.04	- 1.87
4	East North Central	94,851	106,783	95,639	1,336,309	1,319,556	-11.17	- 61	+ 1.27
5	East South Central	18,106	19,884	20,570	258,826	268,040	- 9.40	-11.98	- 3.54
6	West North Central	33,720	39,899	33,553	478,348	467,069	-15.49	+ 5.50	+ 1.76
7	West South Central	44,311	44,825	41,857	517,015	506,303	- 1.15	+ 5.86	+ 2.12
8	Mountain	15,170	18,326	13,710	187,878	181,416	-17.22	+10.65	+ 3.56
9	Pacific	54,026	58,138	51,498	648,542	643,359	- 7.07	+ 4.91	+ .81
Total—United States		408,534	463,795	403,948	5,471,900	5,441,187	-11.91	+ 1.14	+ .56

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan.,

Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Cal., Ore., Wash.

1957 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

	Period	6,000 lb.* and less	10,000 lb.	10,001- 14,000 lb.	14,001- 18,000 lb.	18,001- 26,000 lb.	26,001- 33,000 lb.	Over 33,000 lb.	Total
First Quarter		139,575	38,996	9,157	39,434	16,509	11,533	9,085	274,567
Second Quarter		137,081	45,692	11,961	51,060	21,632	13,689	9,953	301,606
Total—Six Months		276,656	84,688	21,118	90,494	38,141	25,222	20,251	576,395
Third Quarter		117,541	34,887	8,017	35,532	17,468	15,921	9,619	246,161
Total—Nine Months		394,207	119,555	29,135	126,026	55,609	41,143	29,870	822,556
October		45,053	12,568	3,028	12,971	5,125	4,130	2,802	88,019
November		51,034	13,914	2,517	12,659	5,043	3,388	2,370	92,925
Total—Eleven Months—1957		490,294	146,037	34,680	151,856	65,977	48,661	35,042	1,003,500
Total—Eleven Months—1956		405,405	190,968	37,332	160,372	76,052	52,246	75,129	1,017,504

* Prior to January 1, 1957, vehicles below 10,001 lbs., G.V.W. were grouped "5,000 & less" and "5,001-10,000 lb."

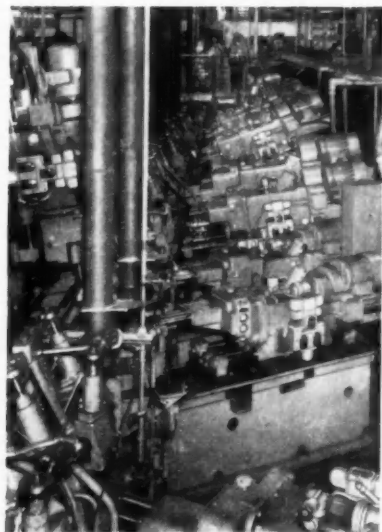
** Included with 26,001-33,000 lb. group.

At The Ford Motor Company's Cleveland Engine Plant No. 1



VICKERS HYDRAULICS

*HELPS CUT MAINTENANCE COSTS
of Machinery Supplied by These Companies
to This Modern Automated Plant*



Typical transfer line installation shows ample use of Vickers hydraulics for actuation and control of automated operations.

High production is convincing proof of equipment reliability—one of many reasons why Vickers Hydraulics is engineered into equipment for modern automated production plants.

The above manufacturers find that Vickers Hydraulics simplifies installation and minimizes piping—benefits also enjoyed by the user. Vickers highly efficient pumps produce significant power savings . . . Vickers controls help minimize scrap and rework by providing precise positioning for machining and other in-process operations. Component dependability helps provide extended periods of uninterrupted production. Demountable unit construction simplifies on-the-job repairs and helps reduce downtime.

The Vickers complete line of components is ideally suited to hydraulic equipment standardization and interchangeability, reducing replacement inventory. Our application engineers will supply detailed information without obligation. General Catalog 5001B is available upon request.

7996

VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

Machinery Hydraulics Division

**ADMINISTRATIVE and
ENGINEERING CENTER**

Department 1428 • Detroit 32, Mich.

Application Engineering Offices: ATLANTA • CHICAGO
CINCINNATI • CLEVELAND • DETROIT • GRAND
RAPIDS • HOUSTON • LOS ANGELES AREA (El Segundo)
MINNEAPOLIS • NEW YORK AREA (Springfield, N.J.)
PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt.
Lebanon) • PORTLAND, ORE. • ROCHESTER • ROCKFORD
SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS
TULSA • WORCESTER • Factories also in: AUSTRALIA,
ENGLAND, JAPAN AND GERMANY • In Canada: Vickers-
Sperry of Canada, Ltd., Toronto, Montreal and Vancouver

**ENGINEERS AND BUILDERS OF OIL HYDRAULIC
EQUIPMENT SINCE 1921**

A I R B R I E F S



By **RALPH H. McCLARREN**

ASTRO Division Formed

Marquardt Aircraft Co., Van Nuys, Calif., has designated its Long Range Planning and Research Division as "ASTRO," a contraction of Air-Space Travel Research Organization.

The company is combining research efforts with experience in ramjet engines to develop power systems capable of propelling missiles from the surface of the earth into outer space. It is planned to make use of an air-breathing cycle of power while the missile is traveling through the atmosphere to provide a superior overall system performance.

Aircraft Employment Continues to Drop

Employment in the aircraft and parts industry averaged 848,000 workers during October, 1957, the sixth month employment has declined since the peak month of April, 1957, when 909,100 workers were reported by the Bureau of Labor Statistics. This is a drop of nearly seven per cent during the April-October period. The number of workers involved is 61,100.

Employment continued to drop in November and December. Major reason for the decline in employment is the series of project cancellations, cutbacks and slowdown of deliveries ordered by the military services. However, the aircraft industry is continuing to hire employees in highly-skilled categories.

Average hourly earnings increased slightly during October to \$2.39 from \$2.38 in September. Average weekly earnings, which includes overtime premiums, in-

creased from \$95.68 in September to \$95.84 in October. Weekly hours dropped from 40.2 in September to 40.1 in October.

Helicopter Exports for 1957

Value of U. S. helicopter exports for 1957 increased 49 per cent over 1956, the Export Service of the Aircraft Industries Association reports.

During 1957 the total value of helicopter exports was \$42,874,928 compared with \$28,700,485 in 1956. Manufacturers, including Sikorsky, Bell, Hiller and Vertol, exported 236 helicopters in 1957 compared with 178 units in 1956, an increase of 33 per cent. These figures do not include used or new helicopters exported by dealers, owners or through military aid, either reimbursable or grant aid. These are direct factory shipments only.

Light Weight Liquid Gas Container

Two stainless steel shells, fitted together in the fashion of a vacuum bottle in an improved design by AiResearch Division of the Garrett Corp., requiring 37 per cent less welding, has undergone successful tests up to 20 g's centrifugal loading.

Liquid oxygen is contained at -297F and liquid nitrogen at -318F. The new container, for example, used with a small heat exchanger to convert liquid into a gaseous state, provides a lightweight oxygen supply system for pilot breathing and flight suit pressurization at high altitudes.

Personal and Executive Aircraft Exports

Canada, Brazil and Argentina are the three largest foreign customers for U. S. built civil aircraft of 6000 lb and less empty airframe weight. During November of 1957, 21 foreign countries and two U. S. Territories received 77 of such aircraft valued at a total of \$1,044,000.

Manufacturers represented included Aero Design, Beech, Cessna, Piper and Taylorcraft. During eleven months of 1957, 1038 aircraft were exported valued at \$15,937,710. This represents a considerable increase over the corresponding 1956 period when 861 aircraft were exported valued at \$11,018,969. Exports for 1957 represented 19.8 per cent of the total shipments made by the five aircraft manufacturing companies.

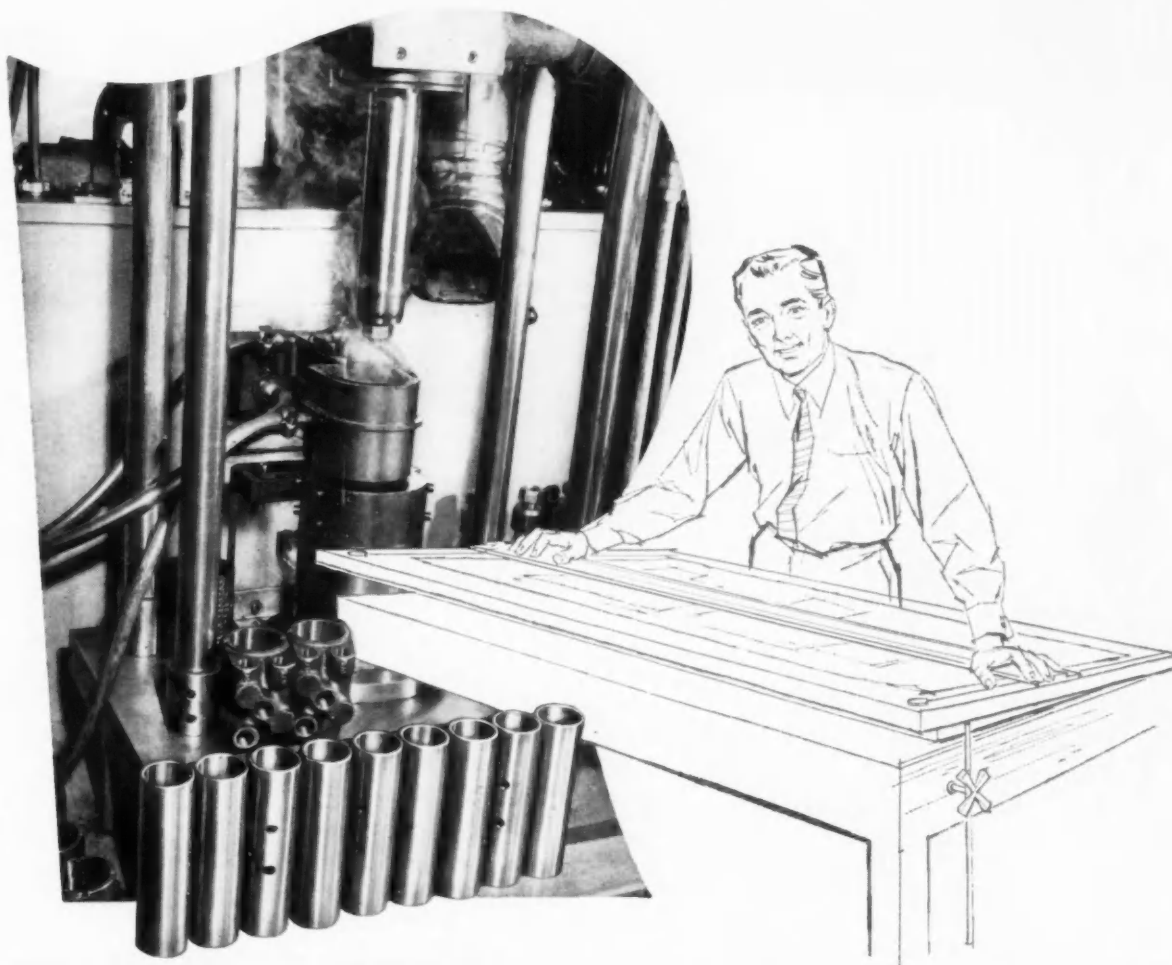
Aviation Military Budget for Fiscal 1959

Not allowing for special funds and expenditures which have already and may be further appropriated for missile procurement by the military departments, the Federal budget for fiscal year 1959 calls for an expenditure of \$10.2 billion for aircraft and missiles. This is slightly under the \$10.4 billion estimated expenditure for 1958.

Aircraft and missiles account for nearly 75 per cent of the total estimated expenditure of \$13.75 billion for military hardware in 1959.

Here is a comparison of expenditures in billions since 1951:

(Turn to page 150, please)



**"B&W Welded Tubing with special smooth ID finish
keeps my fabrication problems to a minimum!"**

As a design engineer for hydraulic applications, I find that B&W Welded Carbon Steel Mechanical Tubing with special smooth ID finish offers outstanding benefits.

The finished condition in which it comes to our plant reduces costs by eliminating a number of fabricating operations."

The uniform finish of this type of tubing means that for many hydraulic applications it can be used "as received" from the mill—eliminating such operations as grinding and polishing. Continuous quality control through every manufacturing operation—with ultrasonic testing supplementing accepted methods of inspection—makes sure that you get tubes matched to your end-use application.

Ask Mr. Tubes, the B&W specialist—he can help you with any tube problem—or write for bulletin TB-428. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



TA-8009-M2

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals.

The BUSINESS PULSE

The Recent Improvement in General Sentiment Is Due in Part to Recent Developments in Washington. The Next Several Months Will Probably Be of Great Importance in Determining Issue of Early Upturn in Business

The decline in general business appears to have carried over into the new year. This is indicated by a range of weekly statistics covering both production and distribution and also by data on bank loans and unemployment insurance claims.

In spite of this extension of the recession, there is some evidence that general sentiment has improved recently, or at least stabilized. This is suggested by the firmer tone in equity markets (stock prices were higher at the end of January than at the beginning), and by some talk in business circles that the bottom of the slide may be close at hand.

Outlook Expectations Strengthened

Oddly enough, the very fact that the decline in business was as steep as it actually was in the final months of 1957 may have helped to strengthen outlook expectations. Many people have been convinced all along that only a mild downturn for the economy was indicated, one no greater than those of 1949 and 1954. They now see that a correction of considerable proportions has already occurred and that it begins to approximate the earlier setbacks. Thus, granted the assumption that only a mild corrective was needed, it is not unnatural for them to infer that much of the present adjustment has been completed.

This point probably has particular relevance to the degree of inventory reduction which has occurred. Preliminary estimates indicate that liquidation was proceed-

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

ing at a seasonally adjusted annual rate of \$3 billion in the final quarter of 1957, and this undoubtedly seems large to those individuals who have been anticipating a cut-back in stocks of no more than \$1 billion to \$2 billion. To them, the end of the inventory recession now appears only a few months away.

Whether the improvement in sentiment which seems to have occurred is fully justified by the facts of the economic situation is, of course an open question. It could be that the optimists (including the authors of the Economic Report) have been too optimistic.

Early End to Decline?

The case that they are currently presenting for an early end to the decline and the early reappearance of an uptrend involves the following propositions: (1) personal consumption expenditures are likely to be well maintained, since unemployment insurance benefits are helping to sustain income; (2) residential construction outlays, aided by easier credit, seem to be on the rise; (3) the decrease in investment spending may be short-lived, in part because reductions in outlays have already been in progress in some industries for more than a year; (4) State and local government spending is heading up; (5)

so too are Federal outlays; and (6) present inventory holdings are generally not heavy, so that it seems unlikely that liquidation will be accentuated.

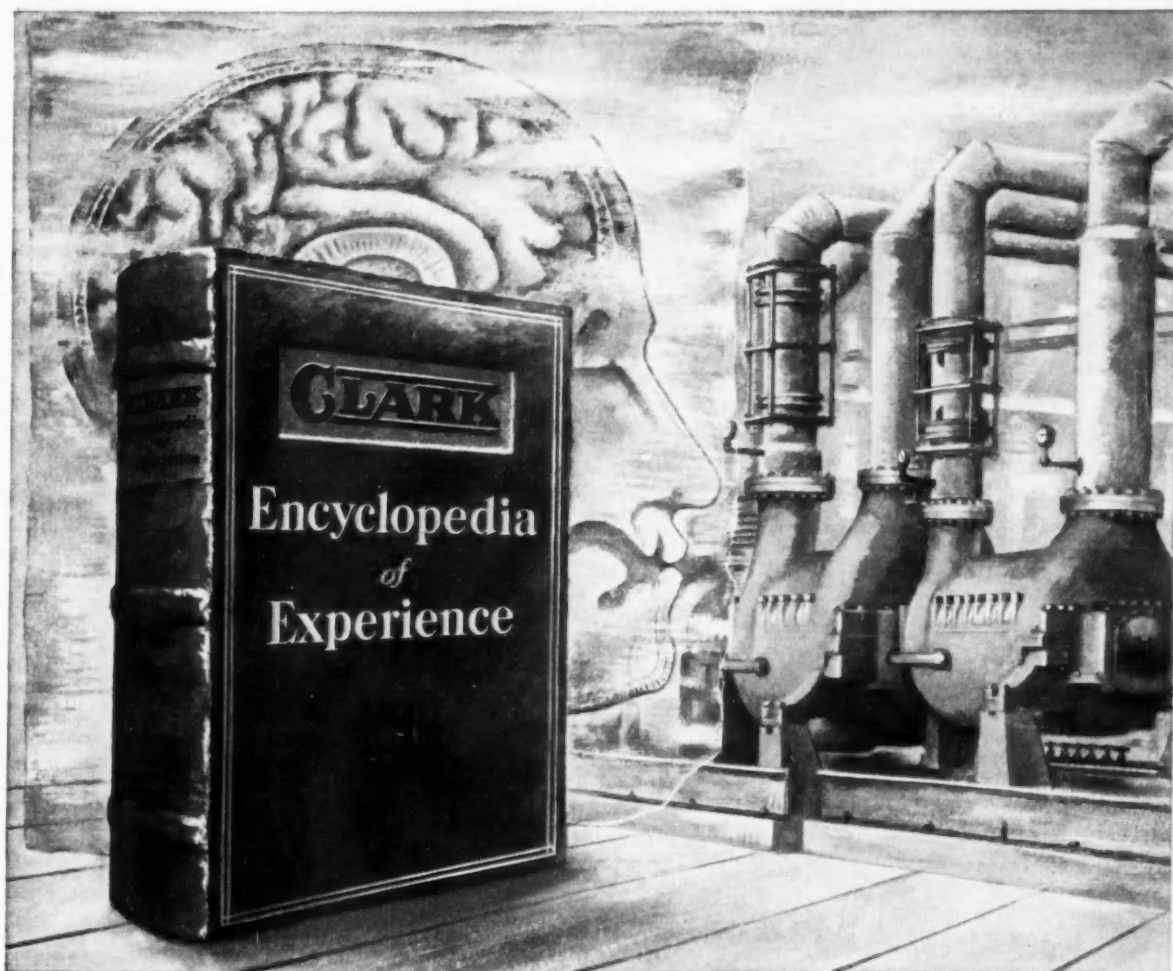
Two of these propositions meet with little argument as far as most analysts are concerned: first, the expectation of a rise in State and local spending is commonly shared; and second, so is the prediction of a rise in Federal outlays. But on other matters there is decidedly less agreement.

To the extent that the authors of the Economic Report and others take a high level of consumption expenditures for granted, they show an optimism that is by no means universally shared. It is true that the decline in consumer income is being mitigated by unemployment-insurance benefits, but it is important to remember that spending is conditioned in part by factors other than the level of current income. Attitudes, for one thing, are also obviously important, and there is some evidence that these have been deteriorating since the recession began.

Report from University of Michigan

The Survey Research Center of the University of Michigan reports that a study conducted during December indicates a sharp drop in consumer optimism since last June, with a consequent downgrading of consumers' plans to buy major durable items. These studies have been reasonably accurate in pointing up buying trends in the past,

(Turn to page 156, please)



Behind every Clark Compressor and Gas Turbine is an **ENCYCLOPEDIA OF EXPERIENCE**

The performance of a manufacturer's products over the years reflects the knowledge and skills of their builder. This compendium of engineering wisdom at Clark Bros. Co. can best be described as the Clark *encyclopedia of experience*.

The field performance of Clark's heavy duty compressors, and the engines and gas turbines which drive them, has earned for Clark the reputation of building "precision by the ton". Clark engineering, supported by the Clark *encyclopedia of experience*, is responsible for this performance and precision.

From Clark's vast experience, the needs of industry for ever better machines have been met. From it have come the many Clark contributions to the petroleum, chemical, and process industries.

It was the Clark *encyclopedia of experience* which was responsible for: the balanced/opposed principle for compressors...the world's first 2-cycle turbo-supercharged gas-engine-driven compressors and the

oil seal that made centrifugal compressors practical. These are but a few of the "firsts" and of the developments, plus the precision and performance, with which Clark engineering is credited. All stem from the Clark *encyclopedia of experience*.

If you use air or gas, you can get full information about Clark products to serve your industry by calling your nearby Clark engineer. Or write Clark Bros. Co., 2201 Lincoln Avenue, Olean, New York.

CLARK BROS. CO.

One of the Dresser Industries

Sales and service outlets in principal cities throughout the world



COMPRESSORS • GAS TURBINES

Automotive Uses for Plastics

Discussed at

SPE Conference

By Joseph Geschelin

OVER 52-million pounds of plastics were consumed in 1957 in passenger car production by General Motors Corp. alone, according to a keynote address by C. A. Chayne at the National Technical Conference of the Society of Plastics Engineers held in Detroit late last month. About 2.1 lb per car was thermosetting and about 13.3 lb per car was thermoplastic material.

Lightweight Vehicles

Looking to the future, Chayne visualized a trend to lighter weight vehicles, and indicated that this could spur a wider use of aluminum, magnesium, titanium and plastics. He suggested some new applications that could broaden the usefulness of plastics. One example is an adhesive of some sort for cementing trim parts to the body panels so as to eliminate fastening clips and hole cutting. Protective coatings for exterior bright parts and plastic fuel lines are other possibilities that could pay off.

Plastic Tooling

GM's Process Development Staff is now engaged in studying applications of plastic tooling. They are looking for high strength, low cost plastic materials for casting dies with a base cost of less than 10 cents a pound. GM Divisions al-

ready have adapted plastic tools for forming and drawing dies to fabricate stainless steel up to 0.080 in. thick; all-plastic hydroform punches operating at 13,000 psi; drilling fixtures and templates; models and Keller blocks; and machining, checking, and assembly fixtures. Recently the Fisher Body Div. completed, in less than a week, a draw die in plastic for forming an underbody for a prototype model where previously it took several weeks of time and considerably more expense.

Technical Sessions

Apart from the address noted above and the banquet paper by Dr. Henry Pildner of the Atomic Energy Commission, the technical sessions encompassed 100 papers presented in the course of four days. There were four simultaneous sessions each period. Since many of the papers were highly technical and dealt with chemical and development problems, this report is confined to a brief review of a group of selected papers of immediate interest to the user.

Replacement of Other Materials

In reviewing the general field of automotive applications, Dr. E. J. Storfer, Chrysler Corp., commented on the replacement of other materials by plastics. He cited the case of defroster duct outlets which have replaced die-cast parts. This application requires a material which is not only color stable and conveniently mass-produced but one having a minimum cold flow and dimensional variations with temperature. The answer was found in Forticel, a high grade cellulose plastic.

This application was followed at Chrysler by molded instrument bezels as well as exterior parts such as headlamp bezels and housings.

Laminated phenolic thrust washers have replaced metal washers in the planetary gear system of an automatic transmission. A special glass-filled phenolic compound (Durez 16771) was selected for making a gear in the rear pump of an automatic transmission and the same formulation was found acceptable in producing the rotor type gear used in the front pump. Oil and fuel lines of nylon are being exploited to replace relatively expensive metal tubing.

Storfer also drew attention to a group of three new high heat resistant thermoplastics being investigated for automotive use. Delrin, produced by du Pont, is tough, strong, practically equivalent to metal die castings even in exterior applications; Lexan, a polycarbonate resin from GE; and Penton, a Hercules Powder polychloroether.

Plastic Body Structures

Stemming from the successful use of reinforced plastics in the body structure of the Corvette, J. G. Coffin, Chevrolet Div., discussed the pros and cons of plastics in the structure of motor cars. Corvette bodies still are being produced with matched die techniques, the latest development being the use of aluminum reinforcements for highly stressed parts. One of the major problems that still remains is that of producing a high quality, high lustre finish. Among the methods being investigated are: surfacing mats of varying weights, textures, and even material filler; and resins, particularly those having low shrinkage.

In the field of pre-mix molded parts, Coffin advised that development work is under way on compounds incorporating dacron, orlon, or nylon. It is reported that moldings made with dacron reinforce-

(Turn to page 136, please)

*Scrivener's Parking Building,
Baltimore. Aluminum paneling is
treated with beautiful
Bonderite Architectural Green.*



sheathed in aluminum . . . and protected by **Bonderite Architectural Green**

You'll see many more buildings, like this attractive structure in Baltimore, using aluminum finished with Bonderite Architectural Green. There are so many things to recommend this beautiful, durable Bonderite coating!

Treatment with Bonderite Architectural Green protects aluminum from corrosion. The same protective treatment chemically produces a soft, lasting green color which is a part of the integral coating of the metal surface. Color is sun-and-weather-fast.

Bonderite Architectural Green costs far less than electrolytically produced color coatings for aluminum. It is simple to use, and the color uniformity is a sure visual

check on the uniform quality of the coating, maintained in volume production day in and day out.

Bonderite Architectural Green may be applied by spray or immersion, and by continuous strip treatment.

Metal treated in this manner can be used not only in construction panels, but also for siding, awnings, venetian blinds and many items on which the excellent color and durability contribute to a better, more salable product.

Write for descriptive illustrated booklet "Bonderite 700 Series". Details on Bonderite Architectural Green, uses, advantages, characteristics.



PARKER RUST PROOF COMPANY

2178 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE
corrosion resistant
paint base

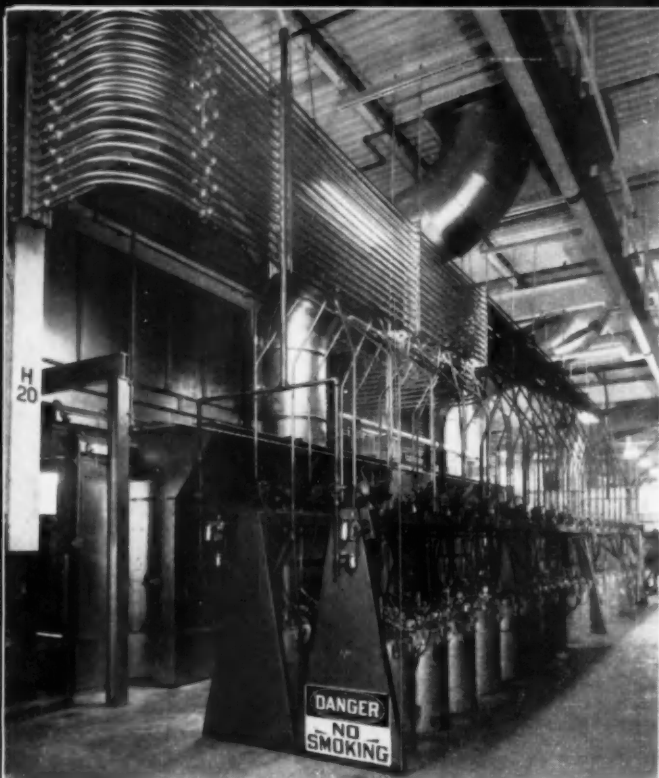
BONDERITE and BONDERLUBE
aids in cold forming
of metals

PARCO COMPOUND
rust resistant

PARCO LUBRITE
wear resistant for friction
surfaces

TROPICAL
heavy duty maintenance
paints since 1883

**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*



An important part of the Arlington B-O-P plant's spray painting facilities is a multi-color paint circulating system. Seen in this picture are the mixing tanks and paint lines leading to the spray booths for small painted parts.

junction with much of the 45,000 ft of conveyor equipment installed in this plant. In addition to large booths for applying the first two coats of paint to hoods, fenders and bodies of the cars, several smaller booths are employed in painting moldings, gasoline tanks, compartment covers and similar parts.

All spray booths at the plant are tailored for their particular functions. A clear illustration is the long, narrow booth used for applying the first two color coats to hoods and fenders. This booth utilizes an overhead conveyor which moves the parts slowly along as paint is applied from manually operated Binks model 19 spray guns. A double bank of air filters, set into the floor and extending the length of the booth, removes all pigment from the air as it is drawn down by exhaust fans.

Final paint repair booths are used to touch up any scratches that may have occurred during the finishing.

Various types of pressure tanks are used, including standard models for finishing operations, and heavy duty tanks to hold the heavy viscosity, semi-fluid materials used for undercoating the automobile bodies.

Every spray gun working off the special Binks paint circulating system sprays paint from a single source. This enables parts to be spray painted in separate areas, yet reach the assembly line with identical finishes. Mixing tanks keep the paint in con-

(Turn to page 131, please)

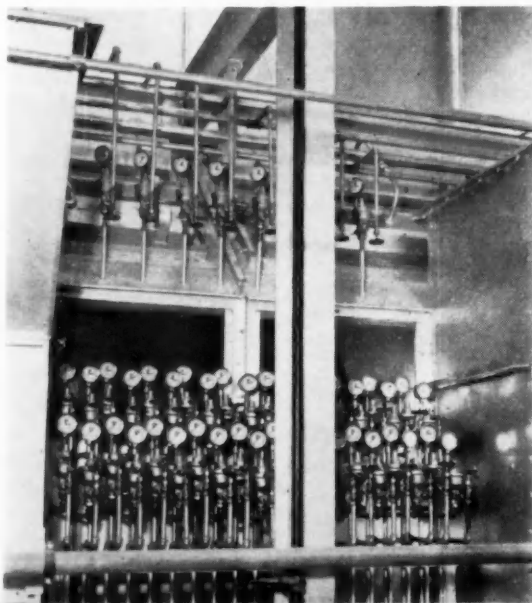
High Efficiency Painting Equipment at B-O-P Assembly Plant

COMplete, large size spray painting facilities at General Motors' 30 acre Buick-Oldsmobile-Pontiac Assembly Division plant at Arlington, Texas, are highlighted by several large spray booths especially designed for fast, efficient application of the finish coats. A custom-tailored paint circulating system utilizes deluxe mixing tanks and paint lines, fluid pressure regulators, manually operated spray guns and oil and water extractors in the painting operation. The great majority of the finishing equipment in use at the plant was produced by the Binks Manufacturing Co.

The Buicks, Oldsmobiles and Pontiacs assembled and finished at the Arlington plant require many different paint colors to make up the various paint options offered by these three General Motors automobile makes. The wide variety necessitates complex scheduling on the finishing line and in the paint mixing room, for Arlington's spray painting equipment is sized on an impressive scale.

Several different Binks booths work in close con-

These Binks fluid pressure regulators assure constant pressure in paint lines leading to all spray booths.



Plymouth



Electro-Voice
High fidelity components



T. SHRIVER
and COMPANY, INC.
Chemical apparatus

Dodge

Kenner
PRODUCTS COMPANY
Toys



FRESH'ND-AIRE



Textile machinery

NOELTING
Faultless
Casters



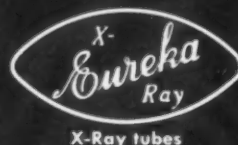
VENDO
Vending machines



Plastic parts molded by
Admiral-MP/d

go into the products
known by these famous
trade names

These and other first-rank
manufacturers look to
Admiral-MP/d for an able assist in
maintaining their position out front.



PLAN IT FOR PLASTICS

Write today for book describing
Admiral-MP/d facilities and
capabilities.

- RESEARCH & DEVELOPMENT
- COMPRESSION MOLDING
- INJECTION MOLDING
- REINFORCED PLASTICS MOLDING

Admiral **MP/d** MOLDED PRODUCTS DIVISION
CORPORATION P.O. Box 388, West Chicago, Illinois

..... Trends in the CONSTRUCTION EQUIPMENT INDUSTRY

By
Kenneth Rose



Allis-Chalmers HD-21 tractor

ACTIVITY in the manufacture of construction equipment continues at a slow pace. The most important announcement regarding employment was that from Caterpillar Traction Co., that it was reducing work schedules at most of its plants in the United States to four days a week, starting the middle of January. This is in addition to layoffs of about 7000 workers during the preceding month or so.

A brighter note was struck by the Construction Equipment Division of International Harvester Co., which announced that it recalled several hundred employees just before the holidays.

Improved Tractor

Allis-Chalmers Manufacturing Co. announces changes in design of its HD-21 tractor to make it more productive on the job. The 225 hp

turbo-charged Diesel crawler has a matched torque converter and power train, longer track for better stability, and conveniently located controls. The tractor weighs about 45,500 lb bare, and about 55,000 lb equipped with dozer blade. Maximum pull at the drawbar is about 70,000 lb.

Highway Program Progress

With the Federal Highway Program in operation for 18 months as of January 1, 1958, progress has been summarized as follows:

Total work programmed—4960.9 miles	Cost	\$4,027,643,000
Total construction completed or in progress—3175.3 miles	Cost	\$1,729,960,000
Preliminary engineering and right-of-way acquisition authorized	Cost	\$1,238,136,000
Work in program stage only—1785.6 miles	Cost	\$1,059,547,000
Federal aid funds apportioned to states but not yet programmed—\$1,519,074,000		

In this tabulation, the construction total and the total for prelimi-

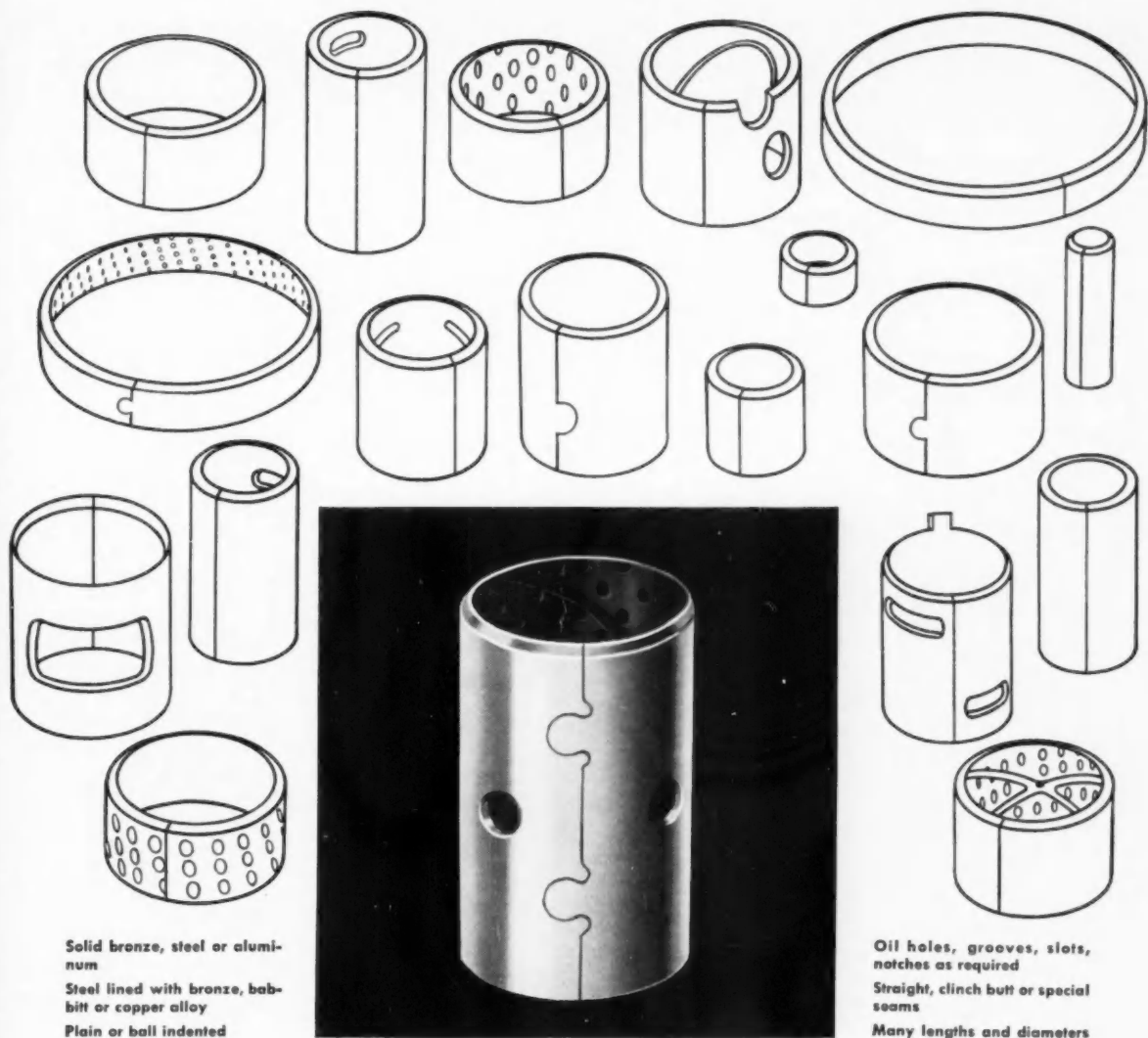
nary engineering and right-of-way acquisition include only work authorized since July 1, 1956.

As of January 1, 1958, construction was under way upon 2092 miles of highways under the program, with an estimated cost of \$1,123,000,000. Construction was completed upon 1255 miles, costing \$270,000,000.

The Bureau of Public Roads announced that work had been completed upon 46 miles of the Interstate Highway System during December, 1957, at a total cost of more than \$22 millions. During the same month, contracts for the construction of 118 miles of system highway were awarded, at a cost of nearly \$64 millions, and preliminary engineering and acquisition of right-of-way was authorized for additional mileage. The preliminary engineering was estimated to be worth nearly \$32 millions, and the right-of-way acquisition was expected to cost nearly \$227 millions.

With Congress in session, several ideas and suggestions from officials in Washington dealing with the highway program have been circulated. One was for a stretchout of the program so that the completion date would be 1980 instead of 1972. In a study of progress being made, it turned out that eight states are ahead of schedule, 33 states and the District of Columbia are on schedule, and the remaining

(Turn to page 116, please)



Bearing Performance • Bushing Economy plus special design features

Savings in materials, time and labor are possible using bimetal or plain rolled split bushings. Bimetal bushings provide bearing load-carrying qualities. All offer economy through volume production. Uniformity and strength

are established through controlled alloy quality and grain structure. Our method of manufacture also permits wide flexibility in design features. Complete engineering service. For details, address:



FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11037 SHOEMAKER, DETROIT 13, MICHIGAN

RESEARCH • DESIGN • METALLURGY • PRECISION MANUFACTURING

RETARDER SYSTEMS for Heavy Vehicles in Europe

(Continued from page 72)

fere with the function of the system if this is intended primarily as a retarder. In practice the exhaust brake has proved itself over and over again, and all heavy vehicles used by the Swiss army and manufactured in that country have been fitted with it. Although cut-

ting off the fuel supply prevents the engine from reaching a high working temperature, this is not reduced unduly, since the employment of the engine as an air compressor results in mechanical energy being converted into heat. Braking is progressive, since com-

pression pressure in the exhaust system is built up when the butterfly valve is closed. Exhaust—or intake—noise is often slightly increased when the brake is applied, but the fuel economy achieved in connection with the fuel cut-off is quite appreciable.

One of the oldest and most successful exhaust brake systems is the Oetiker brake, which was first introduced over 30 years ago and which is built under license in various countries, such as the Fowa-Oetiker brake in France and the Clayton-Oetiker brake in England. In some versions and particularly in the earlier examples the brake did not use a butterfly valve, but a two-stage disk valve mounted on swinging levers and moving in a plate flange fitted between the exhaust manifold and the exhaust pipe. First, the larger disk is moved into position and blanks off a major portion of the exhaust system. After an interval the second disk closes the exhaust completely, all exhaust gases being cleared in the meantime and only intake air being present for the subsequent braking. With the Oetiker system a compression pressure of up to 20 psi can be obtained. This is a function of engine speed and usually increases slightly more than proportionally with rising rpm. Various control systems have been developed, and the device is suitable for both gasoline and Diesel power units.

The German Ade-Haller exhaust brake follows similar principles, but control can be effected either by mechanical linkage, by compressed air, by electricity or by a combination of the two latter methods. A foot-operated button is employed for the three latter systems, maintained foot pressure being required with compressed air, whereas the button must be pressed from 5 to 10 seconds when a partly or entirely electrical system is fitted. The fuel cut-off device consists of a scissor-type lever system or a power cylinder for Diesel engines, and a cut-off flange interposed between the carburetor and the intake manifold for gasoline engines. The butterfly valve has a chamfered-off circumference in order to reduce back-pressure in the open

(Turn to page 114, please)



Combination or straight LP-Gas Conversions carried in stock.

Any size engine, liquid or vapor, 6-, 12- or 24-Volt will run better, last longer and cost less to operate with Beam LP-Gas Carburetion.

Simplest of all to install. No priming or choking required with any Beam LP-Gas Conversion.

When ordering state make of engine, model, year, number of cylinders, voltage.

Beam carries *all* parts necessary for a complete conversion.

SEND IN YOUR ORDER NOW

BEAM PRODUCTS MFG. CO.

Best Buy

Chapman 5-5791



BUTANE-PROPANE CARBURETION

3040 ROSSLYN ST. • LOS ANGELES 65, CALIF.

REGULATORS • CARBURETORS • SOLENOID VALVES

ust
ter-
-or
in-
ied,
in
is

uc-
is
was
ago
in
the
and
En-
ar-
he
ve,
ed
in
ex-
ust
is
off
rs-
nd
ly,
in
air
nt
m
to
a
s-
an
n.
en
le
er

st
s,
er
n-
a
n-
l-
s,
e-
e-
m
r
l.
f
a
t,
-
-
o
n

3

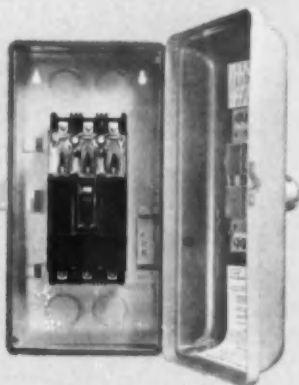
from Westinghouse

LOOK

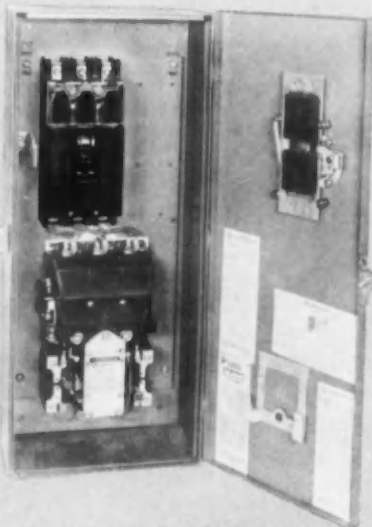
the contacts are visible!

SAF T VUE

WORLD'S FIRST BREAKER WITH CONTACTS VISIBLE



In AB-I Breakers



In combination Life-Line starters

Safe, Sure, Protection

They're calling it "the biggest thing in circuit protection since Westinghouse developed the breaker!" You can *see* the contacts are open, or closed, through the heat-resistant thermoplastic window. Yet the breaker is still dead-front, with no exposed live parts.

What's more, the transparent window won't cloud during repeated full-load switching or interrupting—won't cloud even on normal overload interruptions.

In case of a high-value short circuit, the Saf-T-Vue breaker window clouds immediately—giving you visual warning of serious trouble on the line. In this rare instance, the transparent window can be easily and inexpensively replaced.

SAF T VUE in Westinghouse

AB-I Breakers

Good news for steel mills, automotive plants, *all industry*—Saf-T-Vue is available in Westinghouse AB-I breakers in sizes F through LM. And you can get them in enclosures for every conceivable application.

SAF T VUE in Westinghouse

combination Life-Line starters

In combination Life-Line starters*, too! Saf-T-Vue Breakers add one more "plus" to a long line of Westinghouse exclusive features: all front-removable parts; positive De-ion® arc quencher; bimetallic disc overload relay; knife-edge fulcrum that prevents armature sticking or binding; and many, many more—

For complete information on this exciting new Westinghouse development, contact your nearby Westinghouse sales office or distributor, or write Westinghouse Electric Corporation, Standard Control Division, Beaver, Penna.

*Trade-Mark

J1-30289

YOU CAN BE SURE... IF IT'S
Westinghouse

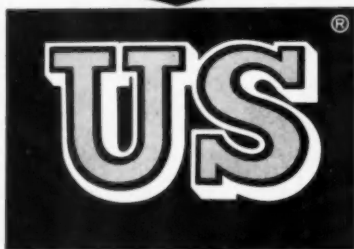




Westinghouse Electric Corp.
STANDARD CONTROL DIVISION
Beaver, Penna.



"BANK ON"



SHAFTS...

VITAL PART OF YOUR PROFIT DOLLAR



FREE

VALUABLE BROCHURE

Shows you why U.S. Axle is your best source for precision-made special shafts.

THE U. S. AXLE COMPANY, INC.
Pottstown, Penna.

Please send me the brochure on "U.S. Custom-Engineered Shafts."

Name

Firm

Address

City Zone State

A broken shaft on a single piece of equipment can "pull the pin" out of your profit machinery fast! With U.S. shafts, you, too, can bank on extraordinary dependability and long life. Why? Our 38 years of top quality manufacturing by specialists in shaft engineering and production. Fine alloy steel, modern heat treating, and shot-peening for extra strength provide up to 5 times greater toughness. No wonder that so many of industry's wheels turn more profitably on U.S. Shafts!

Custom designed to do your job better, faster, more dependably, more profitably! Write today for our valuable **FREE Brochure**.

"THE WORLD TURNS ON U. S. AXLES"

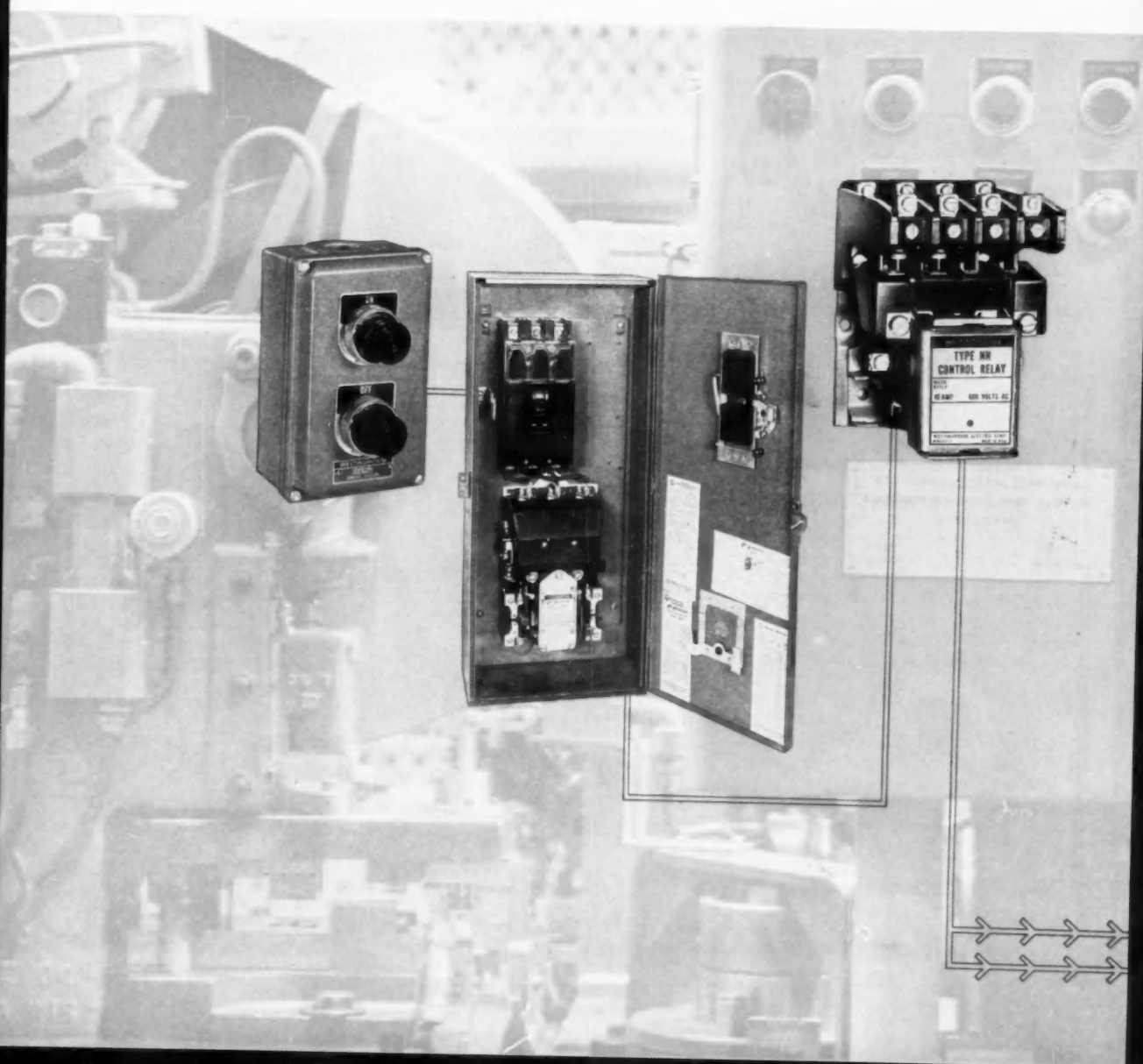
THE US AXLE COMPANY, INC.

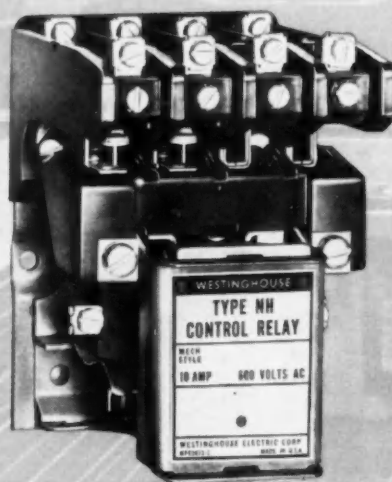
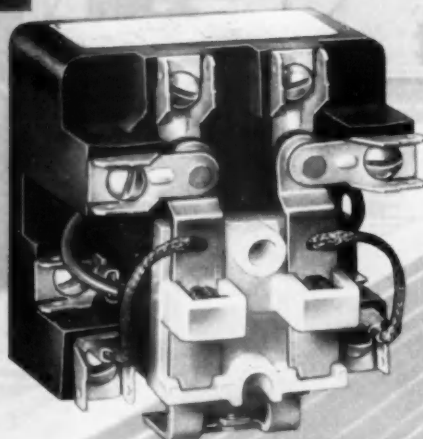
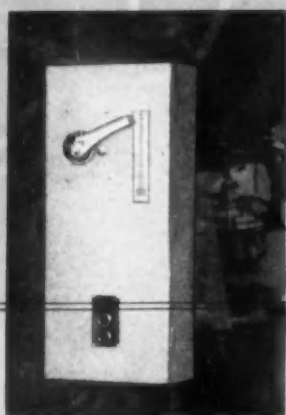
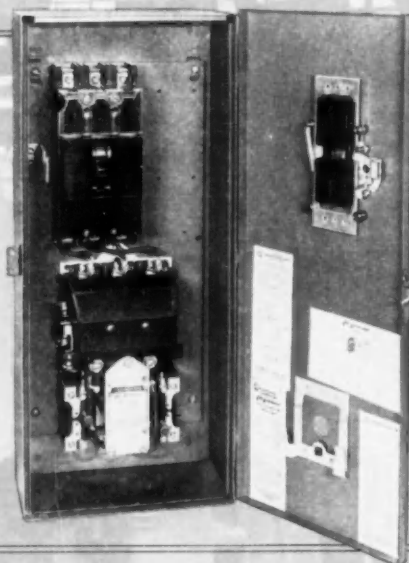
Since 1920 • Pottstown, Pennsylvania

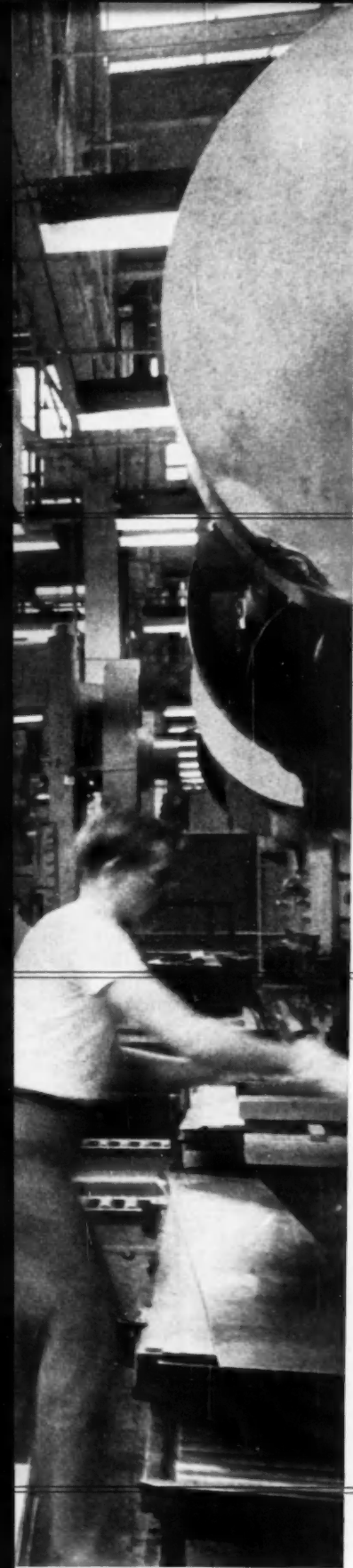


WESTINGHOUSE FOR CONTROL

Westinghouse matched control for machine tools







Westinghouse Push-to-Test and Pushlites

MAKE CONTROL PANEL SPACE WORK TWICE AS HARD

The Westinghouse Pushlite—a pushbutton plus an indicating light—means you need only half the usual number of units per panel. Frees up to one-half of your control panel for other units, other functions.

Matter of fact, you can make this same panel work *many times* harder with the newest addition to the Westinghouse line—a double-pole, double-throw contact unit that gives you twice the use from a single Pushlite! You can't beat that for space economy—just as you can't beat Westinghouse for Pushlite quality.

For added savings, use Westinghouse Push-to-Test indicating lights. They take the guesswork out of indicating light failures—simply press the light to find out whether bulb (or circuit) is out of order. (As you'd expect, both Pushlite and Push-to-Test are Westinghouse developments.)

Westinghouse Life-Linestarters

RUGGED PERFORMERS FOR RUGGED-DUTY APPLICATIONS

Tested on the toughest jobs—in saw mills, cement factories, chemical plants—these Westinghouse Life-Linestarters* have proven to be industry's most dependable performers. There are good reasons for this superiority, of course. Westinghouse Life-Linestarters feature all front-removable parts for fast, easy maintenance.

And additional auxiliary interlocks which can be added to all starters to handle additional loads.

Then there's the exclusive positive-break, bimetallic disc overload relay—gives you the option of hand reset, automatic reset or no-stop operation. (Available with an auxiliary normally open bell alarm contact.)

And the knife-edge fulcrum that prevents armature sticking or binding.

And the exclusive Westinghouse De-ion* arc quench grids that eliminate contact burning and pitting.

And much, much more—

*Trade-Mark

Westinghouse Relays

ASSURE YOU MILLIONS OF OPERATIONS WITHOUT A SINGLE FAILURE

And here's a relay that will match—operation for operation—any relay on the market today. It's good for millions of operations—to meet the *most demanding* machine tool specifications for reliable, long-life relays.

That's why you just don't go wrong when you specify Westinghouse Relays.

By the way—did you know that the bearing parts of the NH Relay are case-hardened to provide tough, wear-resisting surfaces for longer operating life?

That they're available in any combination of normally open or normally closed contacts from two to six poles?

That for applications where space is critical, the new compact Z Relay—double-pole, double-throw—offers extraordinarily long life?

For the whole story on Westinghouse Controls, contact your nearby Westinghouse sales office. Or write for bulletins B-7073, D-B11-000, and B-6749, Standard Control Division, Westinghouse Electric Corporation, Beaver, Pennsylvania.

J-30288

YOU CAN BE SURE...IF IT'S **Westinghouse**



CUT GLOVE COSTS

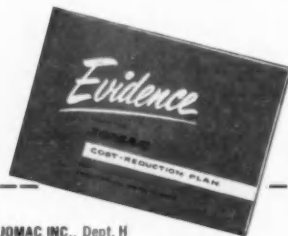


GIVE ADDED PROTECTION with the **JOMAC** COST-REDUCTION PLAN

Customer: leading automobile manufacturer. Operation: fabricating major body components. This is just one more case where the Jomac Cost-Reduction Plan is saving money and increasing worker safety in industry. Write for "Evidence" booklet shown opposite. It will show you how this plan can work in your plant too!

JOMAC
INDUSTRIAL GLOVES

Plants in Philadelphia, Pa., and Warsaw, Ind.
In Canada: Safety Supply Company, Toronto
In Europe: North-Jomac Ltd., London, W1



JOMAC INC., Dept. H
Philadelphia 38, Pa.

☐ Send a copy of your "Evidence" booklet

☐ Have a representative contact us

Name _____

Company _____

Address _____

City _____ State _____

Retarder Systems

(Continued from page 106)

stage to a minimum. Compression pressure obtained with this system varies between 15 and 20 psi.

The Saurer exhaust brake, which is fitted on the concern's own engines only (including, of course, those built under Saurer license) provides for valve closing and fuel cut-off with a single lever. Retardation can be adjusted progressively according to the closing angle of the valve, but the fuel cut-off is functioning as soon as the brake is applied. During retardation a spring incorporated in the fuel pump linkage prevents the admission of fuel into the engine through inadvertent pressure on the accelerator pedal.

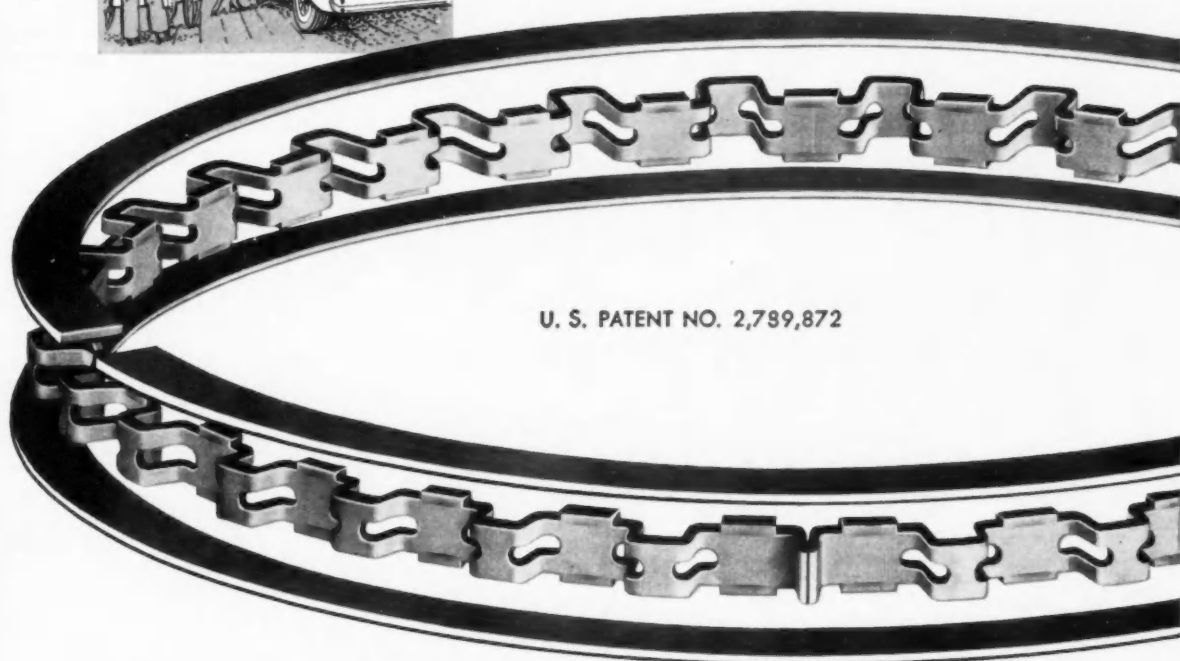
The Mercedes-Benz engine brake is similar to the Saurer arrangement, but in this case the retarder is put out of action as soon as the clutch or accelerator pedal is used. The butterfly valve is actuated by a small button placed on the floor board which opens a valve in the compressed air system of the car and feeds compressed air to a power cylinder connected to the actual butterfly valve. In comparison to the engine braking effect available without the exhaust brake a retardation increase of 150 per cent is claimed.

Two-Stroke Engine Braking

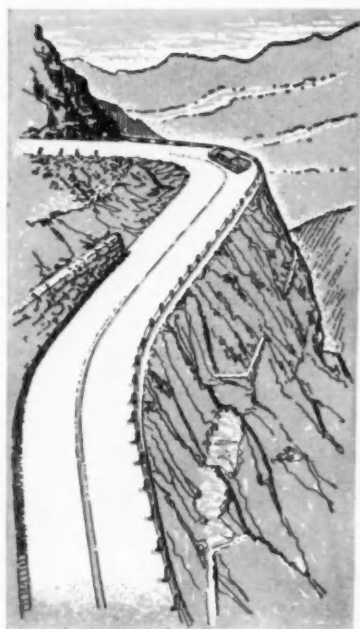
Special problems have to be solved when engine braking is required from two-stroke power units. For the DKW passenger car engine, the braking effect of which is lower than that available in a comparable four stroke engine, a retarder system has been developed by the Swiss firm of Leemann. This incorporates a connection between the cylinders. An interesting engine brake is fitted to the Krupp truck two-stroke engine. In contrast to the exhaust system butterfly valve type, it does not rely upon exhaust throttling, but upon engine compression. The Krupp "Motorkompressor" alters the valve timing in such a manner that the exhaust valves are closed during the actual exhaust stroke. The Krupp two-stroke engine is fitted with over-



Sealed Power's NEW STAINLESS STEEL OIL RING



U. S. PATENT NO. 2,789,872



**WAS PROVED AND APPROVED
AROUND THE WORLD
WITH FORD**

Deserts—mountains—rutted roads—sandy trails—heat—cold—great cities—tiny villages—through all these around the globe, the 1958 Ford was tested—and came through with flying colors.

Also triumphant in the Ford engine were new stainless steel oil rings and associated compression rings by Sealed Power—setting their own records for performance, reliability and economy—the SEALED POWER SS-50U does things no other ring can do.

**SEALED POWER CORPORATION
MUSKEGON, MICHIGAN**

head valves. Actuation is quite simple. The extended hub of the camshaft gear is fitted with internal spiral splines. On the end of the camshaft a coupling with both straight internal and spiral external splines is fitted. These connect the camshaft drive gear to the camshaft. The coupling can be moved axially and thus alters the valve timing. The device is actuated by a lever mounted on the instrument panel which is connected to a shaft carrying a worm and segment gear

on its lower end. The segment is connected in turn to a sliding fork which moves the sleeve coupling. Braking is obtained by turning the lever. A higher compression ratio than with the usual exhaust brake is obtainable, but this system cannot be employed unless it is incorporated in the engine design.

Hydraulic Retarders

Hydraulic retarders have not been used extensively in Europe so far, although several hydraulic

torque converters actually under development incorporate hill retarders. An exception is the French SAMM-Rohacs-retarder which is connected to the engine coolant circuit and uses water or a water and anti-freeze mixture as a working fluid. It consists of a rotor placed between the two stator halves, both being fitted with vanes, the vanes in the rotor center being curved. Slots in the rotor vanes permit very rapid filling up of the device, a fraction of a second being required only after the cock is opened. The fluid circuit consists of an intake pipe connected with the engine coolant circuit just aft of the water pump, and two return pipes from both stator halves, one of them being fitted with a vent pipe. Hydrodynamic principles are similar to those of hydraulic retarders developed in the U. S., but the vehicle radiator is used directly as a heat exchanger. Five types of retarders are made for vehicles from 5 to 40 tons GVW.



HANSEN QUICK-CONNECTIVE TWO-WAY SHUT-OFF COUPLINGS

Both ends of line are positively sealed when you disconnect a Hansen Series HK Two-Way Shut-Off Coupling. To connect, just pull back sleeve and push Plug into Socket. To disconnect, merely pull back sleeve. No tools required. Identical valves in Socket and Plug permit free flow of gas or liquid when Coupling is connected—practically eliminate spilling of liquid or escape of gas when disconnected.

WRITE FOR THE HANSEN CATALOG

Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings—including Special Service Couplings for Steam, Oxygen, Acetylene, etc.



REPRESENTATIVES IN PRINCIPAL CITIES

SINCE 1915



QUICK-CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN

MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Construction Equipment

(Continued from page 104)

states behind schedule. These last eight have not yet committed any of their 1958 funds, and some part of 1957 funds remain uncommitted. These states, South Carolina, Montana, Maine, South Dakota, Idaho, Indiana, Delaware, and West Virginia, have assured the highway director that they have plans to advance the work within their borders during 1958, and to catch up with the program, said Mr. Tallamy, federal highway administrator.

Higher Costs

Discussing the increased cost of the Interstate Highway Program, Secretary of Commerce Weeks said that revised estimates have shown that costs are 37 per cent higher than the amounts authorized in the 1956 Act. "This increase is due in part to increased prices, but principally to increased work required by the 1956 Act not contemplated in the original determination of the amounts authorized," he said.

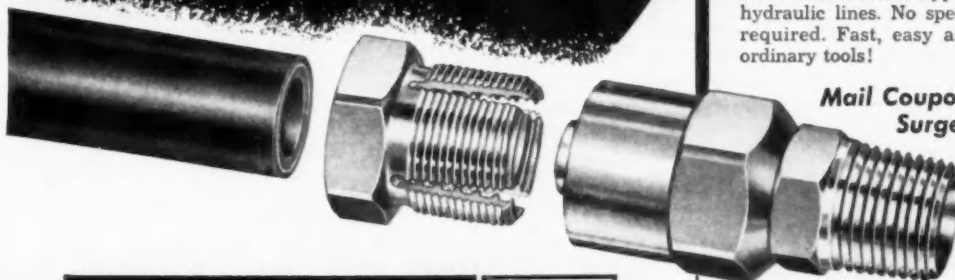
He did not feel that additional revenue legislation was needed at this time, he said.

** Fastest in-the-field replacement!*

** First choice for original equipment!*

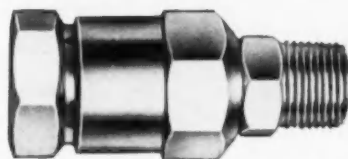
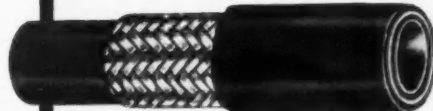
The Complete Line of
**ALEMITE
 SURGEPRUF**
**REUSABLE COUPLINGS AND
 HYDRAULIC HOSE**

*...with a full line of components
 nationally available!*

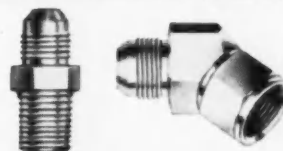


1850 Diversey Parkway, Chicago 14, Illinois

Single- and Double-Wire Hose For Medium-High Pressure and High-Pressure Service. Seamless inner tube of synthetic rubber, reinforced steel wire braid, and synthetic rubber outer cover. Resists abrasion, weather, and oil. Hose temperature operating range: -40°F. to $+275^{\circ}\text{F.}$



Couplings. Made of high-strength steel. "Double-wedge grip" forces coupling threads through rubber cover . . . grips either single- or double-wire braid firmly. Saves both time and labor!

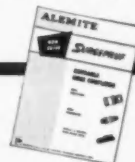


Adapters and Swivel Adapters. Full range of sizes in J.I.C. and other threads. One-piece adapters—and swivel union adapters to simplify assembly and avoid twisting strain in cramped quarters.



Hose Assemblies. Types and sizes for all hydraulic lines. No special assembly tools required. Fast, easy assembly with just ordinary tools!

Mail Coupon for Surgepruf Catalog!

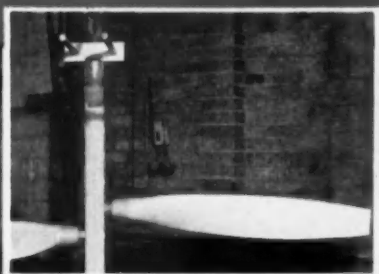


ALEMITE, Dept. U-28
 1850 Diversey Parkway, Chicago 14, Illinois
 Please send me your catalogs of Surgepruf couplings, hose and components.

Name
 Company
 Address
 City Zone State

use a SLOW-SPEED drill
for GRINDING?

and why
not?



One of the final steps in the production of propellers at McCauley Industrial Corporation is the anodizing of the propeller blades. To insure complete coverage in the vat, each blade is attached to the dipping fixture by an expanding bolt fitted into the opening at the hub end of the blade.

After anodizing, this opening must be carefully finished to remove any burrs caused by the expanding bolt. The shape of the opening requires the use of a cone wheel. The work to be done requires a slow speed tool, much slower than would normally be used with an abrasive

attachment of this type and size.

So, for this metal removal job, a Buckeye drill, with cone wheel attachment, was recommended! It's a small tool, just 7 inches long; it's a light tool, less than two pounds. Makes it easy to get a perfect finishing job every time, without disturbing the exact tolerances typical of McCauley props.

The Buckeye Tools approach to unusual portable tool problems is refreshingly free from time-worn traditions and preconceived notions. Perhaps this uninhibited approach could help solve your portable tool problem.

Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

For a special air tool for a difficult job, or a standard air tool for routine work, your best buy is Buckeye. Write for our new catalog.

Buckeye Tools
CORPORATION

3011 SPRINGBORO PIKE • DAYTON, OHIO

Car and Truck Rentals

(Continued from page 59)

expected life is not uncommon.

Turnover time for leased cars is usually two to three years. Trucks may be held four, five, or six years, depending on the use made of the vehicle. Since there is nothing "standardized" about the car and truck rental and leasing industry, the replacement factor will vary widely from area to area.

Models and Equipment

National Car Rental System, Inc., operator of 600 stations in the U. S. and abroad, estimates that as many as 50 per cent of car rental units now in service are four-door sedans and perhaps another 25 per cent are two-door sedans. The remaining 25 per cent would be divided equally between convertibles, station wagons, and hardtops.

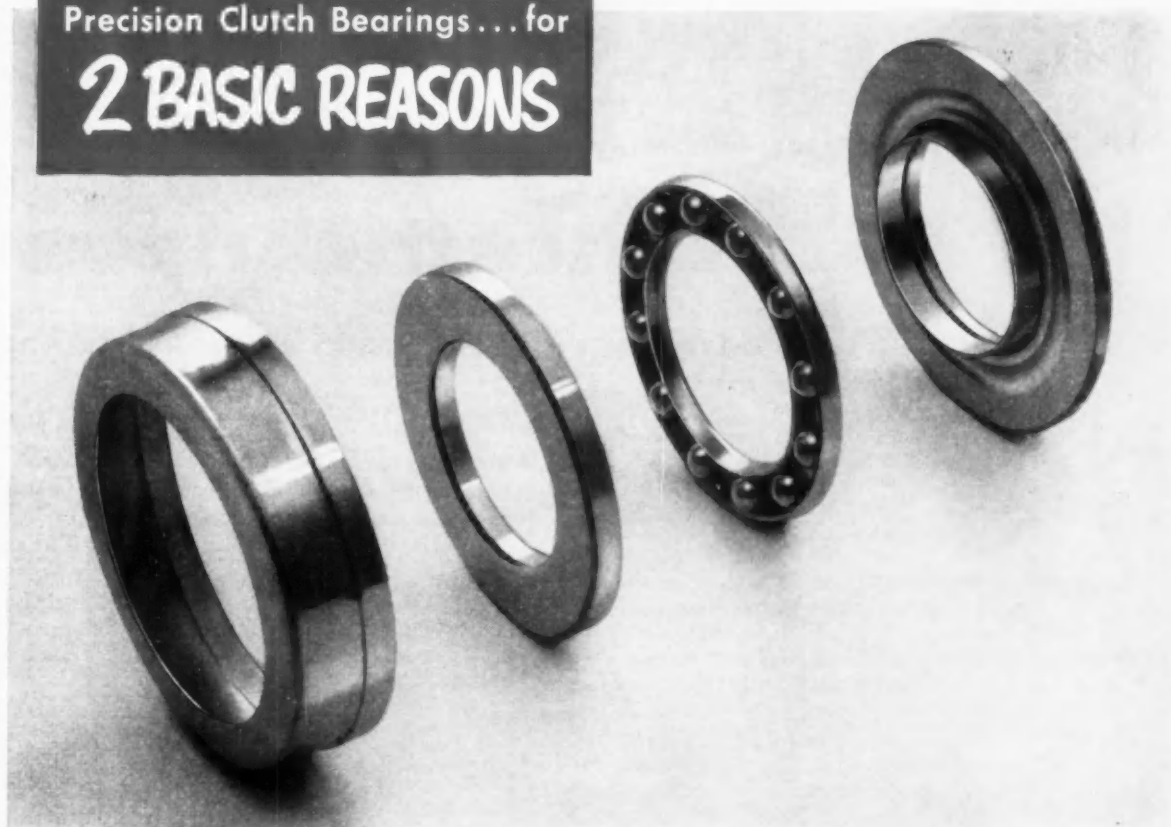
There is, however, a strong trend in the car rental industry to replace two and four-door sedans with two and four-door hardtops. Many NCRS offices this year, for example, will be offering only hardtops in place of sedans. By the same token, 75 per cent of the recent Hertz order for 19,737 new 1958 cars (see above) is for four-door hardtops with power brakes, power steering, radio, and heater; 20 per cent of the remainder is for convertibles and sports cars, and five per cent is for station wagons.

Due to their popularity and higher resale value, about 90 per cent of the rental cars currently in service are eight-cylinder models. There is a decisive trend in the industry toward buying the top-line models of every make—the Chevrolet Bel Air and Ford Fairlane 500, etc.—instead of the middle and lower line models. The purchase of six-cylinder cars is confined mainly to smaller cars, such as the Rambler, British Ford, and other foreign cars. These are used as "price leaders" for economy-minded customers.

Automatic transmissions have made a tremendous sweep into the car rental field. About 95 per cent of all rental units are now purchased with an automatic transmis-

(Turn to page 122, please)

Engineers Specify BCA
Precision Clutch Bearings... for
2 BASIC REASONS



Endurance...

BCA precision clutch bearings exceed engineers' most severe test standards... over 70,000 declutchings at speeds corresponding to more than 60 mph. Performance like that results from such BCA construction features as... high carbon chrome balls... carburized and precision ground steel washers... single piece U-section retainer, designed to trap grease between the rotating members... labyrinth sealed with rigged pressed steel housing and special bronze ferrule... packed with a stable, high temperature grease.

Economy...

BCA precision clutch bearings offer real dollar savings because of...

- low initial cost
- easy installation
- trouble free service.

BCA precision clutch release bearings are backed by 60 years of ball bearing design and manufacturing experience—for all kinds of vehicle applications. Specify BCA clutch bearings for real endurance and economy. Bearings Company of America Division, Federal-Mogul-Bower Bearings, Inc., Lancaster, Pa.

Call BCA Engineers on matters pertaining to bearing problems.



BEARINGS COMPANY OF AMERICA
DIVISION OF
Federal-Mogul-Bower Bearings, Inc.



ANOTHER IDEA PROCESS FROM A. O. SMITH

... partner in your progress thru creative mass production

Giving new to the most

**Now you can take advantage of A. O. Smith's creative talent
... fusing glass to metal**



You know us for our frames — nearly 55 million built since 1902. Mass production of high-quality automotive chassis frames is one of A. O. Smith's most useful talents.

Extending the work-range of steel, giving it vital new dimensions with a fused-on coat of glass is another A. O. Smith specialty. It's a specialty now available to you. And here are a few facts you should know about this remarkable process:

Properties: From more than 3500 glass formulations, special types can be specified to provide desirable combinations of the following advantages:

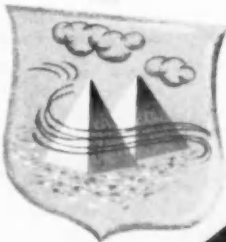
- Resistance to temperatures as high as 1500° F
- Flexibility equal to the yield point of the base metal
- Bond that is both chemical and mechanical up to 10,000 psi

- Resistance to abrasion with minimal maintenance
- Good appearance with hard, smooth surface finish
- High dielectric strength for good insulation
- Resistance to corrosion from virtually all acids through a wide temperature service range

A. O. Smith glass-protected steel could well be exactly what you need to improve your product's performance. Write today for technical brochure describing glass-protected steel. It's just one of many idea processes from A. O. Smith, world's largest manufacturer of glass-protected steel products... partner in your progress thru creative mass production.



**HARD SLICK
SURFACE**



**ABRASION
RESISTANT**



CORROSION RESISTANT



DIELECTRIC STRENGTH

dimensions

useful metals

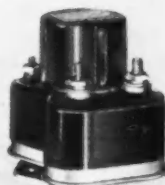
Here are ways A. O. Smith's special talent for protecting steel with glass may serve you



Slick, glass-lined jet pump venturi speeds liquid flow rate and shrugs off corrosion.



Vibrator hub with glass-coated diameter oil seal for better retention with reduced gasket wear.



Hermetically sealed, glass-insulated electrical relay eliminates atmospheric "shorting" problems.



Glass-protected pump impeller blades withstand severe corrosion and abrasion.

Versatility of glass applications to improve product performance is literally endless — A. O. Smith glass-protected steel products include: *Permaglas* home water heaters; storage tanks; smokestacks; industrial storage units; *Harvestore* farm feed processing units; and a line of *Glascote* (subsidiary) products for severest chemical processing service.

Through research  ... a better way

A.O. Smith

CORPORATION

AUTOMOTIVE DIVISION
MILWAUKEE 1, WISCONSIN

A. O. Smith International S. A., Milwaukee 1, Wisconsin, U. S. A.

**PRODUCTION MORE THAN TRIPLED . . .
PAINT MILEAGE INCREASED 75% WITH**



Ransburg
**NO. 2
PROCESS**

One Ransburg reciprocating disk uniformly coats 7 complete sets of gasoline pump housings and parts per gallon of paint. Former hand spray produced only 4 sets per gallon.

● Bowser, Inc. Fort Wayne Division is continuously on the lookout for improved manufacturing methods in the production of their quality line of gasoline pumps.

That's why they modernized their finishing department . . . installed a conveyor . . . new oven . . . and replaced hand spray with one RANSBURG No. 2 PROCESS reciprocating disk unit.

RESULTS? Paint mileage increased 75% with less labor. With hand spray, they painted enough pump housings and parts for 4 pumps per gallon of paint. Now, with *Electrostatic*, they're painting 7 complete pump sets per gallon.

Where Bowser formerly needed two shifts in finishing, one shift now handles even greater production. With hand spray and limited oven facilities, they used to turn out 15 sets per hour. Now, they can paint 55 sets an hour, either prime or finish. Color changes are made quickly and easily with Ransburg equipment, and because of its efficiency in operation, maintenance cost in the paint area is cut 50%.

NO REASON WHY YOU CAN'T DO IT, TOO!

Whatever your product, if it's painted, we'd like to tell you more about the worthwhile savings and advantages which can be yours with RANSBURG ELECTROSTATIC PAINTING PROCESSES. Write for our No. 2 Process brochure which cites numerous examples of electrostatic spray painting on a wide variety of products.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

Car and Truck Rentals

(Continued from page 118)

sion as original equipment. Many operators have found them more economical to operate in rental service.

Radios are installed in nearly 90 per cent of rental cars, and all are equipped with heaters, except those operated in Florida and other warm weather areas. Power steering and power brakes as original equipment are growing in popularity, and it is estimated that over 50 per cent of 1958 cars purchased for rental service will have them.

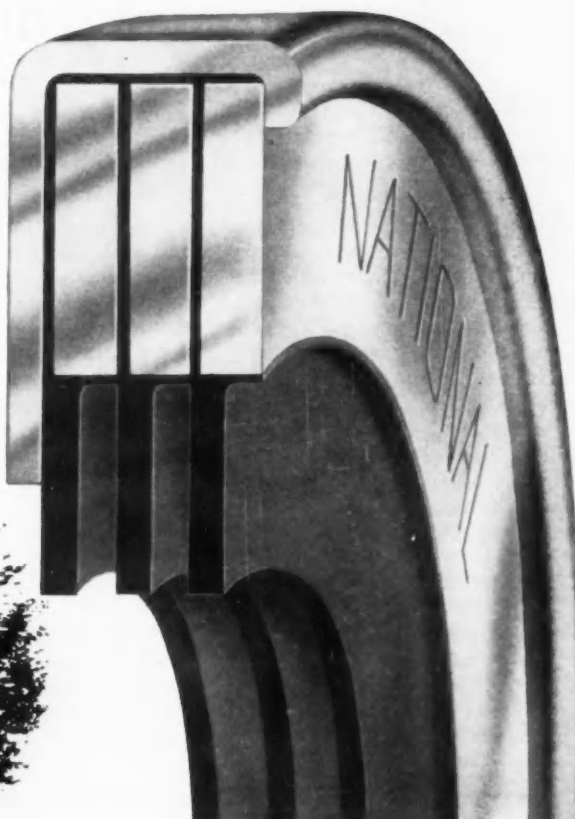
Air-conditioned rental cars are becoming more prevalent in the southern states, and some operators in those areas have as much as 50 per cent of their fleets equipped with air conditioning. As a general rule, such cars carry a slightly higher rate than others, usually \$1 a day and/or one cent per mile.

Outlook for the Future

According to the 1954 census of the car and truck renting and leasing business, gross receipts were \$276,602,000 in that year for the 2864 establishments operating at the time. It is estimated that figures for 1959, when available, will show that the business had doubled since the 1954 tabulations were made. Expansion from now on is expected to be not so much through the addition of a great number of new operators to the 4000 odd establishments currently in existence as through the enlargement of the fleets of present operators.

While short-term vehicle rentals should maintain a steady rise, it is in the field of long-term leasing that a particular boom is anticipated. Due to tax savings, reduced maintenance costs, and other advantages which may accrue to the vehicle user through leasing as against private ownership, there is every indication of continued good growth for the long-term leasing business. For example, lessors of automobiles alone on long-term contracts began the year 1958 with approximately \$250 million worth of vehicles in use by the lessees, nearly all in fleets to large-size companies.

Unique triple-lip National Syntech® seals bearings "underground" in rugged disc harrow application



Low cost, easily installed
Excludes dirt, mud and water
Ideal for permanently lubricated bearings
Effective after 4,000 test hours

The Triple-Lip Syntech seal, pioneered by National, provides a new standard of bearing protection for equipment operating in severe dust, dirt, mud and water conditions.

The seal is rugged and extremely simple in design. It consists of three identical synthetic rubber sealing members bonded to metal washers and enclosed in a rigid steel outer case. Use of the "straight" Syntech sections keeps torque low, simplifies flush lubrication, and permits the seal to accept a high degree of runout and misalignment where needed.

For complete information, call your National Applications Engineer or write direct

NATIONAL SEAL

Division, Federal-Mogul-Bower Bearings, Inc.
 General Offices: Redwood City, California
 Plants: Van Wert, Ohio, Redwood City
 and Downey, California



4540

New Engines and Accessories at NATIONAL BOAT SHOW

(Continued from page 62)

tension ignition as well as battery-charging current.

The Palmer Engine Co.

Two new "Spacemaker" inboard engines, having a height of only 12¾ in. from the center line of the crankshaft to the top of the engine, were shown by Palmer. The reduced height was accomplished by inclining standard six-cylinder overhead-valve engines 16 deg from the horizontal. By reversing the cylinder block assemblies, the company has made available twin engines with opposite rotation. Manifolds, carburetors and other accessories were re-located for accessibility under the hatch.

The Model IH 240-SM "Space-maker" engine has a displacement of 240 cu in., is rated 120 hp at 3400 rpm, and weighs 850 lb with direct drive. Model IH 264-SM has a piston displacement of 264 cu in.,

is rated 135 hp at 3400 rpm, and also weighs 850 lb with direct drive.

Scott-Atwater Mfg. Co.

A three-cylinder-in-line, 60-hp outboard, weighing 160 lb and featuring compactness, is the newest item in the Scott-Atwater line. Bore and stroke of the "Flying Scott" are 3⅛ by 2¾ in., for a total piston displacement of 63.27 cu in. Horsepower rating is at 4800 rpm.

able for use with the motor is a remote, single lever gearshift and throttle control. Another accessory is a tilt mechanism, controlled by remote lever on the dash, for tilting the motor in shallow water operations. Also being offered is "power steering" using an electrically-operated power unit. Control is from a steering wheel mounted to the dashboard or from a portable hand control.

Universal Motor Co.

The company's line this year includes a new V-8 inboard engine which has a bore and stroke of 4 by 3¼ in. for a total piston displacement of 326.7 cu in. It is rated 225 hp at 4400 rpm, and has a direct-drive weight of 870 lb.

New engines in two, four and six-cylinder models, covering 25, 65, 100, 130 and 145 hp, emphasize compactness by use of the Aqua-Pak V-drive which permits the integrated units to be installed close to the transom of most hulls. Each of the five Aqua-Pak models is available with a choice of four gear ratios.

Utica-Bend Corp., Sub. Curtiss-Wright Corp.

Utica-Bend, as the U. S. distributor, exhibited German-made Mercedes-Benz marine Diesels. One of these was the OM 636, four-cylinder engine, rated 36 hp at 3000 rpm—the same unit that powers the German firm's Diesel passenger cars. Also on display was a 564-hp Diesel, and the OM 321, a Diesel rated 96 hp at 2600 rpm.

MAN IN A PICKLE

(A TRUE STORY)

Dick, we just shut down the zinc plating line again. Same old story... parts are dragging soil over and contaminating the pickle tank.

That's the last straw, Mike. This time we've got to get results. I'm calling Steve Choren of Pennsalt, right now!

...I recommend Pennsalt Cleaner K-8. K-8 blasts off smut. It also neutralizes acid soils, and works well in hard water. You see K-8 contains no water. It gives you more cleaner, at lower cost.

Sounds good, Steve. Let's see what Pennsalt K-8 can do to cure the prize production headache in this shop.

THE FOLLOWING WEEK

I see your zinc plating line's going full blast.

Steve, you've got a first-class electrocleaner in Pennsalt K-8. K-8 carries as much current at 8 oz. as our old cleaner did at 10 oz. And on top of that, we're adding less K-8 to maintain concentration.

West Bend Aluminum Co.

New styling and operating conveniences were featured in the West Bend exhibit of eight outboard motors that range from 2 to 35 hp. Devices introduced this year include new speed selector, key starter switch, a "dash light," and easy-action cover release.

World Wide Automobiles Corp.

The German-made Volkswagen aircooled inboard marine engine was displayed by this distributor. Called the Sea-Breeze, the overhead-valve engine has four cylinders horizontally-opposed in pairs and a piston displacement of 72.74 cu in. It is rated 36 hp at 3400 rpm. Featured are compactness, low fuel consumption, and light weight (185 lb).

Buick Awards \$200,000 in 1957 To Employees for Suggestions

Buick awarded nearly \$200,000 last year for improvement suggestions offered by employees. During the year, a total of 12,452 suggestions were made, of which 3512 were put into use. Eight employees gained the top award of \$2500.

ON OUR WASHINGTON WIRE



Good project managers for military research are in short supply. Lack of them is a bigger problem than interservice rivalry in basic studies. No fiscal or buying experts should be allowed to call research signals, Army tells Congress. Getting trained managers is the first need. Keeping them through course of research program is the second.

In setting up a central Government bureau to translate foreign technical publications, U. S. translators should avoid getting bogged down in obsolete material on missiles, rockets, and space travel. Congress fears translators, if not properly directed, will waste time over old reports.

Scientists are renewing their push for lowering Federal secrecy curtains. Undue secrecy in Government is still causing duplica-

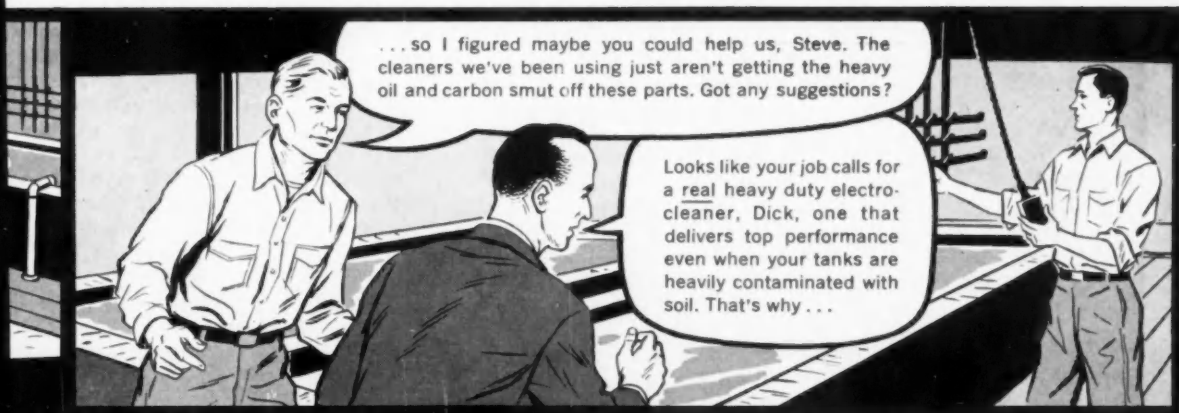
tion, slowing development, and hurting national security. It even involves translating Russian documents—one paper was translated seven times by different agencies, and all translations were secret.

Some striking changes in industrial geography are in the making. AFL-CIO headquarters recently called in a panel of experts to tell about coming shifts, and here are some findings:

- By 1975, some key industrial centers like Pittsburgh and Detroit may become permanently depressed because of company transfers out of the areas.

- Slowly but steadily, centers of industrial production are moving south and west. Within 20 years, more than half of all non-farm jobs will be in south and west.

(Turn to page 126, please)



Yes, I talked to the boys as I came through the shop. Sounds to me as though K-8 surpassed even my expectations.

Ours too, Steve. K-8 is doing a whale of a job. I can honestly say that we wouldn't change materials now even if we were offered another cleaner at lower cost.

Makes good sense to improve metalworking with chemical know-how . . . gained from wide experience in the field. Call in your Pennsalt salesman. He can help you to "A BETTER START FOR YOUR FINISH"

METAL PROCESSING
DEPARTMENT 574
PENNALT CHEMICALS CORP.
3 Penn Center, Philadelphia 2, Pa.



A better start for your finish

To ease your needs for . . .

NEW CAPITAL EXPENDITURES

FAIRFIELD MFG. CO.
Plant in Lafayette, Indiana.



This Ultra-Modern, High Precision
GEAR MAKING
Facility **AVAILABLE
TO YOU**

Simple arithmetic explains why, TODAY, many of America's leading manufacturers no longer undertake to solve the problems involved in making gears. For them, FAIRFIELD IS THE ANSWER!

Every facility is available at Fairfield—cost-cutting, ultra-modern equipment kept busy by volume production. This makes for economy and efficiency that can benefit YOU.

Check with Fairfield NOW on your gear production schedules. As one of the nation's largest independent producers, Fairfield can usually give you quickest service available and handle any production requirement. *Become a Fairfield customer; it pays!* CALL OR WRITE.

FAIRFIELD MANUFACTURING CO.

2303 S. Concord Rd. Lafayette, Indiana
TELEPHONE: 2-7353



Gears and Differentials



Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS



(Continued from page 126)

Methods of reducing the smog-producing elements of automobile engines will be a principal subject of a Government air pollution conference next fall. Sen. Thomas H. Kuchel, R., Calif., a leader in the fight against smog, warns that in another 10 years "most of our cities will be breathing badly polluted air" unless measures are found now to remove the sources.

Manufacturers now have U. S. Supreme Court backing for the right to reduce prices to some—not all—customers in a given area. Producers may in good faith cut prices to certain customers to meet competing prices.

The new ruling specifically concerns pricing by Standard Oil Co. of Indiana. But the effect may be felt in the steel or metalworking industries, too. A supplier might trim his prices in St. Louis or Cincinnati. His competitors, vying for the same customers, might offer similar reductions. The lower prices might be quoted to just those customers who are the targets of competition, not to all buyers in those cities.

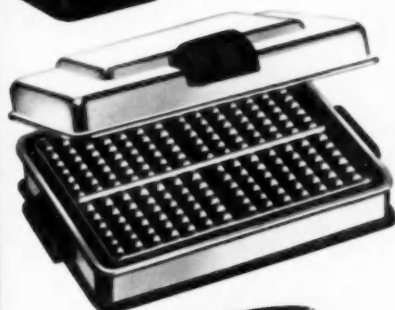
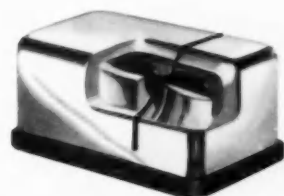
Sen. Thye, R., Minn., urges formation of a special subgroup of Senate Small Business Committee which would aim at promoting broader use of small firms on missile contracts. Principal jobs for small business would be to supply components or perform research. Sen. Thye visualizes the earmarking of some missile contract work for small firms, just as some orders for conventional military items are earmarked.

Two topnotch business leaders say the nation would be much farther ahead in missiles and

(Turn to page 131, please)



Extra help
in the home!



best sellers with

Superior

STAINLESS STRIP STEEL

Powered appliances for the homemaker lend willing help on many tasks—from sharpening knives to broiling chickens. And solid, ever-lustrous Superior Stainless lightens care for the life of each unit: a wipe, and it's bright! Superior Stainless Strip Steel is preferred by appliance manufacturers for dimensional accuracy; precisely as-specified composition, temper and finish; uniform ease of fabrication. • Let us have your requirements.

Superior Steel

DIVISION OF

COPPERWELD STEEL COMPANY

CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York



ANNOUNCING SERSEAL^{*}

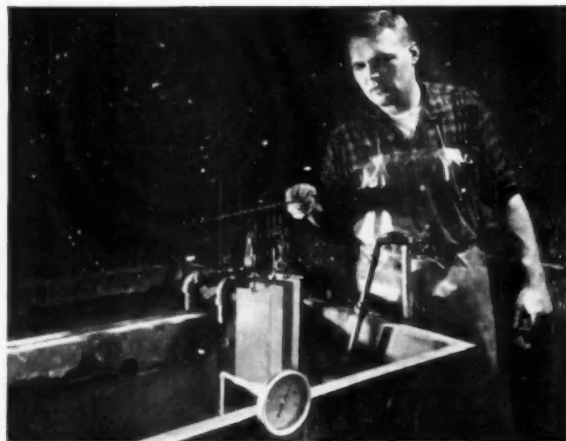
(trademark)

a new chemical blanket for hot phosphating baths

REDUCES FIXED OPERATING COSTS



BEFORE SERSEAL, steam, vapors and fumes escape from the bath, make working conditions unpleasant, lowering morale.



SERSEAL HAS BLANKETED THE BATH in just 10 seconds. All steam, corrosive fumes and vapors are contained within bath.

8 REASONS WHY →



1. Reduces the cost and time required for maintenance of heating elements.
2. Improves working conditions both from a comfort and health standpoint. Steam, heat, fumes and vapors are contained within the bath.
3. Saves up to 70% in heating costs.
4. Cuts warmup time. The blanket prevents heat loss.
5. Less corrosion of surrounding equipment. Corrosive elements are retained in the bath.
6. Less equipment downtime. Baths require less replenishing. Equipment requires less maintenance.
7. Less exhaust equipment required. Since the bath is sealed, there is little escape of fumes and vapors. And in many cases, ventilating systems can be safely eliminated.
8. Lower chemical cost and also less critical control necessary on some processes.

^{*}Patent applied for

Write us today for complete information about this new cost-reducing chemical blanket for hot phosphating baths

AMERICAN CHEMICAL PAINT COMPANY

Ambler 24, Pa.

Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.

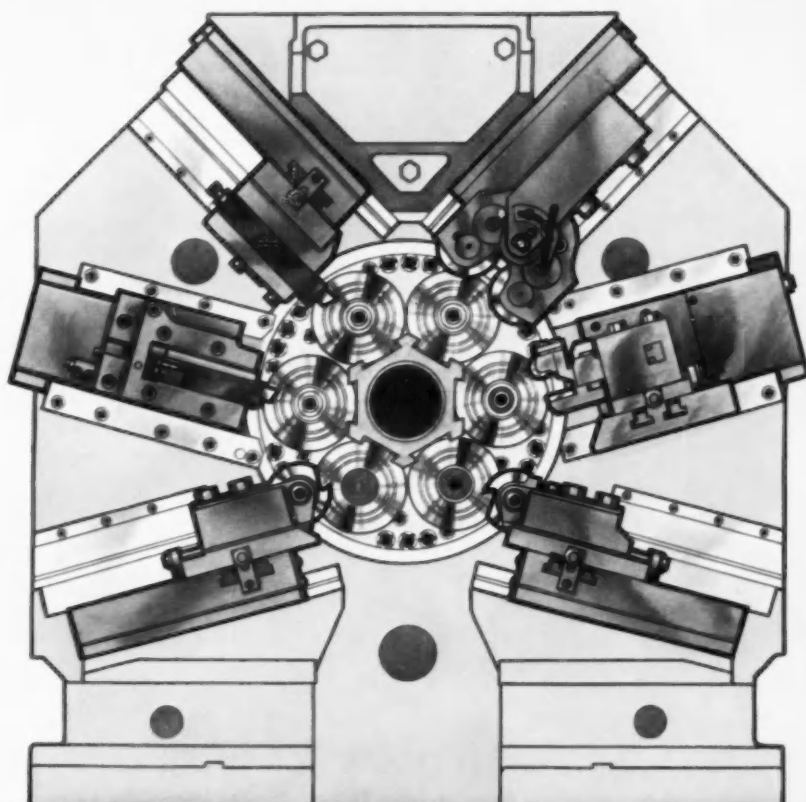
New Chemical Horizons for Industry and Agriculture



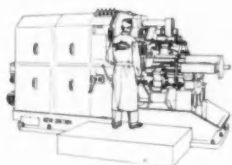
Look at New Britain's
**new cross slide
arrangement**



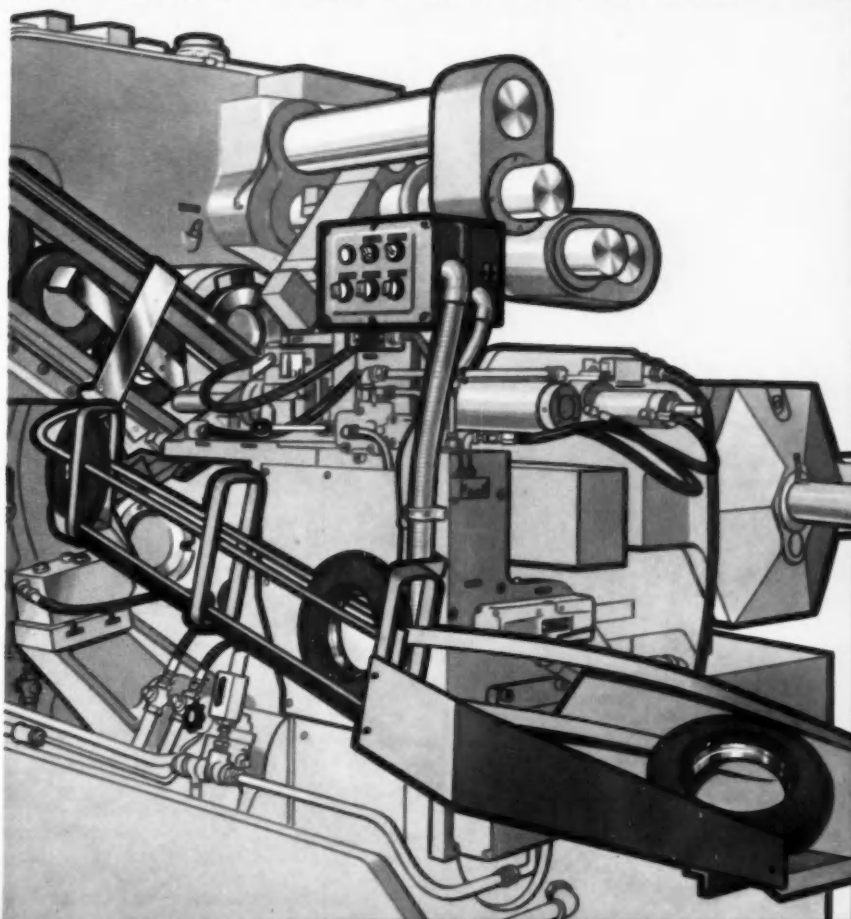
Independent radial cross slides in *all* positions, providing maximum clearance for more cross slide operations.

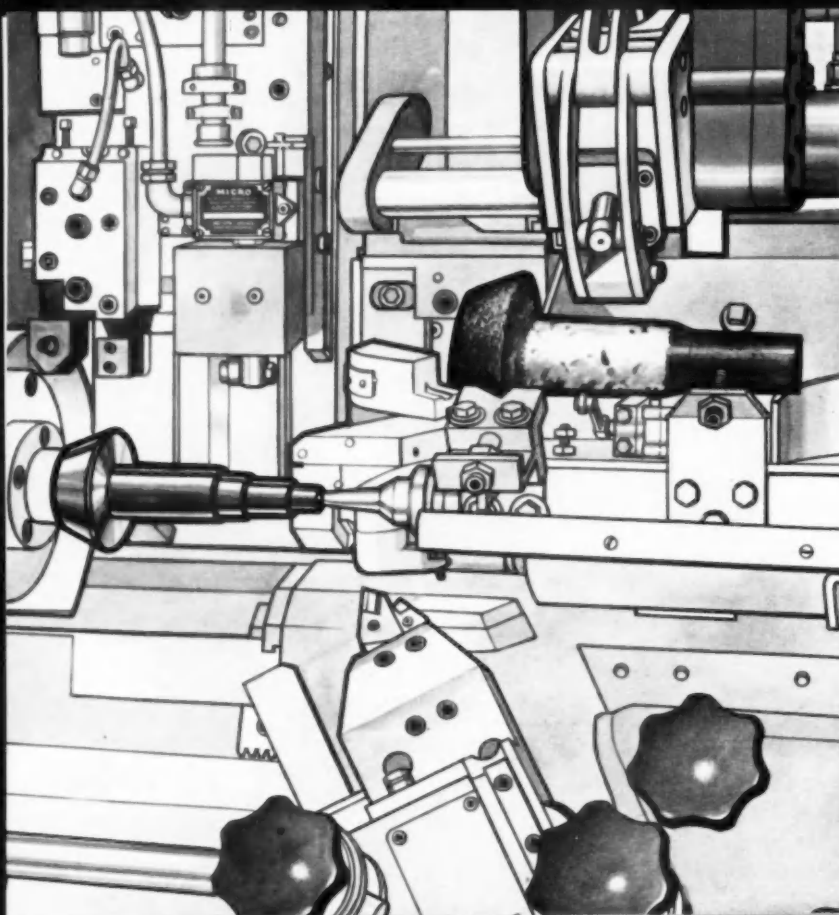


Look at New Britain's
**open-end
chucker design**



Greater accessibility for all applications and particularly well adapted to automatic handling of pieces. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

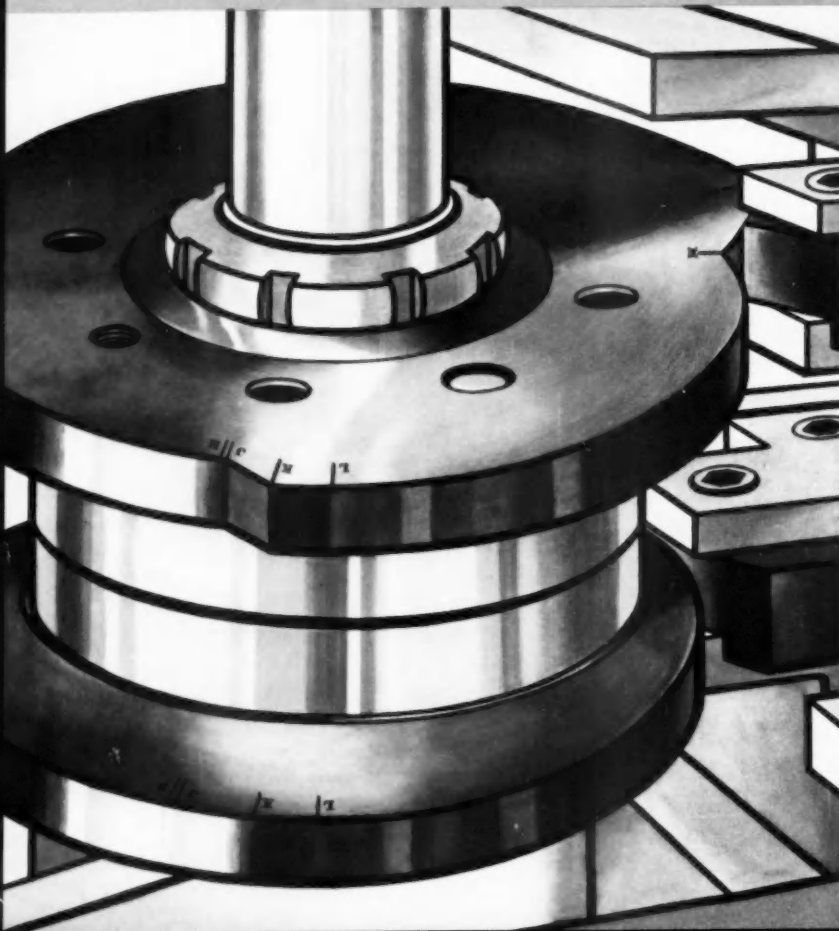




Look at
Automatic Loading on
New Britain +GF+



This basic optional feature can make money for you whether you are working with forgings, bar slugs, or bar stock.



Look at New Britain's
cam-controlled
boring machine



When you are working to tenths there is no substitute for the positive tool control that only precision cams provide. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.



ON OUR WASHINGTON WIRE

(Continued from page 126)

rockets development if the Government fired about half of its Pentagon "experts." Trouble is, claim Dan A. Kimball (president, Aero-Jet General) and Lawrence A. Hyland (general manager, Hughes Aircraft) most of the Pentagon experts do little more than pass papers around and try to second-guess the engineers in industry who are actually turning out products and services for the Defense Department.

The U. S. may have already built its last aircraft carrier. Missiles are fast making them obsolete. Unless called into service in a limited war, the flat-tops will probably never again play an active role in actual combat.

A growing list of congressmen is more impressed by the performance capabilities of nuclear-powered submarines (speed, secrecy) than by flat-tops. It is pointed out that about 50 subs can be built for the price of six carriers. Also, it is noted, Russia has no large carriers and doesn't plan to build any. But the Reds are constantly adding to their fleet of submarines, now estimated at about 200 units.

The Democrats now hold majorities in both Senate and House. And plenty of experts believe they will increase these majorities in the November elections. In this event, the party's leaders must be extra careful during the next two years. A careless or irresponsible show of leadership will only stir up the voters into voting for the underdog.

Congress may act this year to make mergers difficult if not impossible of accomplishment. There's plenty of support for such a law. Official Government fig-

ures show that firms in all industries have been buying out their competitors at a record rate. The result, in almost all cases, is less competition.

Chances are that an anti-merger bill, if allowed to come to a vote, will win by safe majorities in both Senate and House. And the President probably would sign it into law. Both parties favor such a law. Members of congress know that a vote against "big business" is always popular with the voters.

Will success in this year's elections spoil the Democrat's chances for capturing the White House in 1960? At least one Senate Democrat (Smathers, Fla.) thinks it possible. Overconfidence often leads politicians into arrogant, blustering legislative sessions, thereby irritating the electorate into voting for the "outs," instead of the "ins."

Painting Equipment at B-O-P Assembly Plant

(Continued from page 102)

stant motion, assuring thorough mixing and uniformity of color at the time of application.

From the mixing room, the paint travels through a complete circuit, passing all spray stations and returning to the mixing tanks. Thousands of feet of steel paint lines are used to pipe the various paints to the proper booths. The constant circulation of the paint through the pipes, plus agitation in the mixing tanks, prevents pigment from settling. This eliminates any variation in color or viscosity of paint.

Banks of Binks fluid pressure regulators assure constant pressure to all spray booths. Fluid pressure is predetermined by the finishing foreman. Lacquer is used in the finishing process, with primers and glaze for undercoating the bodies also playing an important role.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of
Automotive and Aviation
MANUFACTURING



IN FASTENERS SOUTHERN IS profit!

Southern fasteners can bring speedier assembly, less down-time and less materials loss to your profit picture.

Southern manufactures only profit-producing fasteners, using only USA materials and manpower.

May we hear of your requirements, in order that we may tell you how Southern's price, quality and service can perk up your profit picture?

Address:
Southern Screw Company,
P. O. Box 1360,
Statesville, North Carolina

WOOD SCREWS • TAPPING SCREWS • STOVE
BOLTS • MACHINE SCREWS & NUTS •
DRIVE SCREWS • DOWEL SCREWS •
CARRIAGE BOLTS • HANGER BOLTS

WAREHOUSES:
NEW YORK, CHICAGO,
LOS ANGELES, DALLAS



Huge Expansion Ahead to Meet Market Growth

(Continued from page 69)

capacity that will be required to maintain that average.

Chrysler Corp.

Chrysler Corporation's Mack Ave. stamping plant in Detroit works two shifts to keep up with one shift at the Plymouth Detroit

final assembly plant. The same situation exists at Evansville, Ind., where the body operation works overtime to supply the single-shift assembly line. The Evansville plant, however, already has been marked for replacement within the next two years by a modern \$50

million plant near St. Louis, Mo.

Plymouth

Plymouth's approximate share of the Year X total production will be 1,070,000 cars, based on 1957 breakdowns. This will necessitate a weekly average of about 21,400 cars and capacity for much more.

But Plymouth's present 48-hour capacity is estimated at approximately 17,500 cars. During 1957, the highest weekly production was 17,294 units and the weekly average was 13,100. During 1955, when the division built 742,990 cars, the highest weekly total was 19,987.

All of these figures fall short of the 21,400-car average that Year X will require of Plymouth. So it is evident that Plymouth will need additional manufacturing and assembly facilities prior to Year X.

Chevrolet

Chevrolet set an all-time weekly high of 44,920 cars during the week ended Nov. 23, 1957. To do this, all Chevrolet final assembly plants worked six days and all but one plant equipped for two shifts operated a second shift. This indicates that Chevrolet's current useable capacity is just over 45,000 passenger cars a week.

Chevrolet's average weekly production during the past year was 30,440. During the record year of 1955 it was 36,600 cars. The 50-week average during Year X, however, would have to be 49,400, or better than the current one-week record and some 19,000 better than last year's average.

Ford

Ford Division had its best post-war week during December of 1956, when 41,370 passenger cars were built on a six-day schedule.

The Division's best week in 1957 saw 37,588 cars built. Yet, to produce its 24 per cent share of the Year X total, Ford Division will have to build 49,400 cars in an average week. During 1957, its weekly output averaged only 30,440

Ford Division, in addition to building its own cars, must bear the burden of Edsel production. At the moment this does not place any particular strain on Ford's facilities, but by Year X the situation



- Husky—Heavy Duty
- "Strap Drive"
- Friction-Free
- Smooth Engagement
- Minimum Maintenance

Engineered by BORG & BECK

for that vital spot where power takes hold of the load



BORG & BECK DIVISION

BORG-WARNER CORPORATION • CHICAGO 38, ILLINOIS



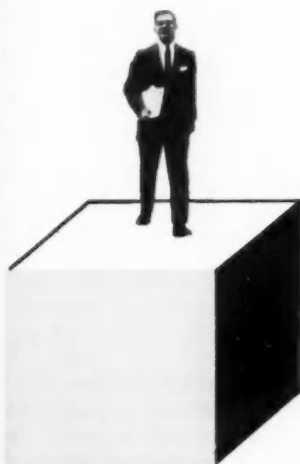
The man from Olin Aluminum stands for a big Service Principle...

He offers you the unique advantage of Aluminum that is custom-tailored, from the start, to your exact requirements.

As salesman, field engineer or technical specialist, he brings to your service a personal reputation for integrity and experience in the Aluminum field. And behind him stands a flexible, compact organization skilled in a special Olin Mathieson Principle of swift, responsible and unwavering attention to every detail of your order.

He is ready to serve you now. Just call any of the offices listed below, or write:

Aluminum Division,
Olin Mathieson Chemical Corporation,
400 Park Avenue, New York 22, N. Y.



ATLANTA · BALTIMORE · BOSTON

BUFFALO · CHICAGO · CINCINNATI

CLEVELAND · DALLAS · DAYTON

DETROIT · HOUSTON · JACKSON, MICH.

KANSAS CITY · LOS ANGELES · MEMPHIS

MIAMI · MILWAUKEE · MINNEAPOLIS

NEW HAVEN · NEW YORK · PHILADELPHIA

PITTSBURGH



Q AND "OLIN ALUMINUM" ARE TRADEMARKS



Symbol of Quality and Service in the Aluminum Industry

AUTOMOTIVE INDUSTRIES, February 15, 1958



purposeful planning

Here's the way to plan a more productive stamping operation. When you roll the bolster through the die area of this model press, it's easy to visualize how "push button" die setting can shrink hours of die setting time to minutes.

It costs money—lots of money—when an expensive, highly productive machine sits idle waiting for a new die setup. Let us show you, with one of our scale models, the way Clearing engineers have knocked the expense out of die setting.

More information about "Push Button" die setting and other Clearing methods of press automation is contained in a new brochure—"The New Economics of Press Automation" You'll enjoy it. Write for it today.



CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION division of **U.S. INDUSTRIES, INC.**
6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

might be much different if Edsel sales improve appreciably.

BOP Division of GM

The Buick, Oldsmobile and Pontiac Divisions of General Motors, which share assembly plants in seven cities to supplement their home plant production, last year averaged an aggregate 22,800 cars a week. Their output during Year X will have to be 37,400 a week to retain their present 18.6 per cent share. Present facilities might be able to build part of the difference, but it is doubtful they could supply the additional 14,600 cars each week of the year. The capacities of Fisher Body Div.'s supplying plants also would figure in the Year X picture.

New Facilities

As mentioned earlier, there are some programs under way or about to be started. Ford will begin assembly operations at Lorain, O. this spring, and two sizeable additions at the Chicago and Atlanta assembly plants will be ready to operate later this year. Chevrolet is expanding its Atlanta and St. Louis plants and has announced plans for later expansion at Kansas City. And Plymouth is building its new St. Louis factory. In addition, there are various manufacturing plants under construction or ready to begin operations.

But before Year X approaches, numerous additional expenditures which as yet do not appear on the books will have to be made to keep the automobile industry ahead of the mobile American populace.

• • •

Hall Lamp Has Record Sales, Cites Use of Dual Headlights

C.M. Hall Lamp Co. of Detroit chalked up record sales for 1957 and credited the universal switch to dual headlights on 1958 cars as the major reason.

The Detroit electrical firm estimated sales for the year just ended will reach \$9 million, compared with \$5.3 million in 1956. Earnings for the year will exceed \$1.75 a share, according to Hall president Harry D. Hirsch.

Hall Lamp's October shipments totaled \$1.4 million, highest in the 48-year history of the company.

MACHINERY NEWS

(Continued from page 79)

will continue manufacture of HSS cutting tools at the B & S plant at Greystone, R. I., and manufacture of tungsten carbide cutting tools at the Nelco Tool Co. plant in Manchester, Conn.

As heretofore, sales of HSS cutting tools will be under the direction of Colin Sharp and sales of carbide products will be headed by Lewis B. Main.

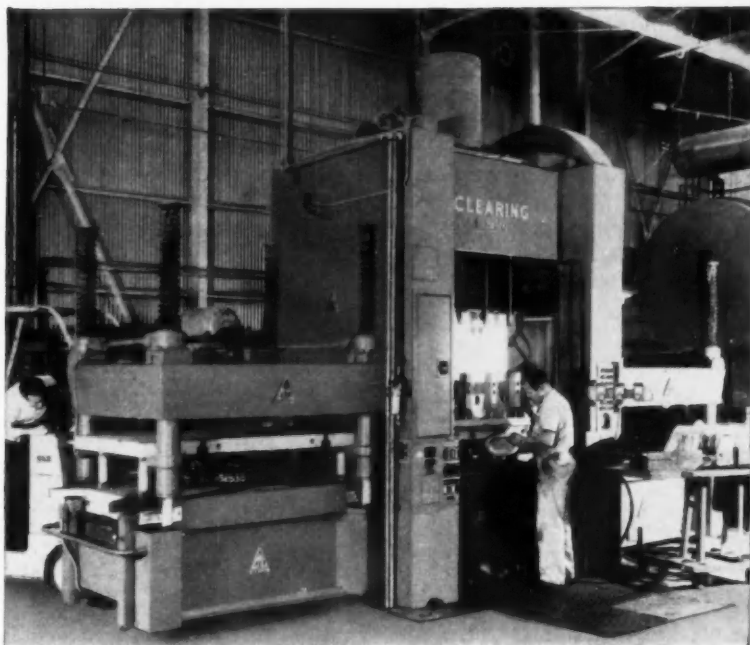
The new organization, according to Henry D. Sharpe, Jr., president, is a further step in the company's program to provide greater mobility and more clearly defined lines of responsibility. Its formation represents an effort on the part of the company to coordinate engineering, manufacturing and sales functions so that dealers in the field will receive concentrated attention and technical liaison in metal cutting tool matters. As part of the move, it is planned to make available trained cutting tool sales engineers in increased numbers throughout industrial areas, within the near future.

Cold Extrusion Method Has Potentialities

Cold extrusion, a technique exploited during World War II, has been given a new impetus in the production of a large variety of small cylindrical steel parts in a program initiated recently by Danly Machine Specialties, Inc.

Danly has supplied some heavy duty presses to several of the large producers of universal joints for the making of bearing cups by cold extrusion methods. These small bearing cups illustrate the manufacturing economies promised by this technique. The part is extruded from a small steel slug which is prepared by punching suitable blanks in another press. The slugs go through a bath for coating with phosphate which serves as a dry lubricant during extrusion. After extrusion the workpiece requires no further turning operations and is ready for grinding.

Potential economy gains from



predictable results

Here it is. A Clearing moving bolster press now earning its keep and then some at North American Aviation, Inc.

Moving bolster presses are especially useful at North American where press runs are comparatively short. "Push Button" die setting turns downtime into productive machine hours. And it's literally "push button", too! When one job is finished, push a button. The new set of dies roll into place ready for the next job.

Estimate the downtime die changing causes in your shop and you can make a pretty good guess as to whether "push button" die setting will pay off for you.

More information about "Push Button" die setting and other Clearing methods of press automation is contained in a new brochure—"The New Economics of Press Automation" You'll enjoy it. Write for it today.



CLEARING PRESSES

the way to efficient mass production

CLEARING MACHINE CORPORATION division of **U.S. INDUSTRIES, INC.**
6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

this method are made possible because, in the first place, it eliminates the usual scrap. The slug represents practically the finished weight of the part. It also eliminates initial machining operations. The method can result in an impressive increase in productivity, while at the same time reducing prime cost, floor space and investment in machinery.

Danly has turned its efforts to the study of other parts involving considerable machining in con-

ventional practice. One of these is the extrusion of spark plug bodies, even including the hex.

Another possible area of economy is found in the production of barrel tappets and hydraulic valve lifter bodies. In fact, it is understood that barrel tappets already are being produced by cold extrusion. When the large volume of hydraulic valve lifter bodies being produced monthly is considered, it is apparent that cold extrusion could be instrumental in

the saving of many dollars and greatly expand productivity in reduced floor space.

Besides the items mentioned above, Danly has carried on considerable experimental work in the cold extrusion of inner and outer races for ball bearings. We are told that races not only can be produced without machining, but that current experimental work indicates the practicability of coining to size and with adequate surface finish so as to eliminate most, if not all, of the final grinding operations.

To those who have followed the progress of chipless production, these developments appear to hold promise. They are certainly worth some consideration and study.

SPE Conference

(Continued from page 100)

ment have better mechanical properties, smoother finish, and adequate moisture resistance. These properties could make the material interesting for exterior applications such as body panels and components.

Uses for Vinylfoam

Considerable attention is being given to a variety of foams for a diversity of applications. Among these is Vinylfoam and its position in the picture was summarized by Henry E. Allen, Elastomer Corp. He pointed out that use of this material is not confined to cushioning. Other uses can be found for its ability to heat seal. From the standpoint of economics, Vinylfoam holds considerable promise. For example, in 1954 foam density was of the order of 8 to 12 lb. Late in 1956 a 3½ to 7 lb range became a production possibility.

Polyurethane Foam

M. J. Sanger, The General Tire & Rubber Co., presented a report on the status of polyurethane foam for automotive applications. Rigid polyurethane foam has sound deadening properties that have groomed

(Turn to page 141, please)



**Johnson
TAPPETS**

Johnson Hydraulic Tappets are dependable and are of the highest quality, both in materials and in workmanship.

Johnson also makes a variety of other styles of tappets, barrel type and mushroom, of various materials, to suit the requirements of your engines.

Let us assist you in the development of the tappets for your new engines.

"Tappets are our business"

**JOHNSON *JP* PRODUCTS
INC.**

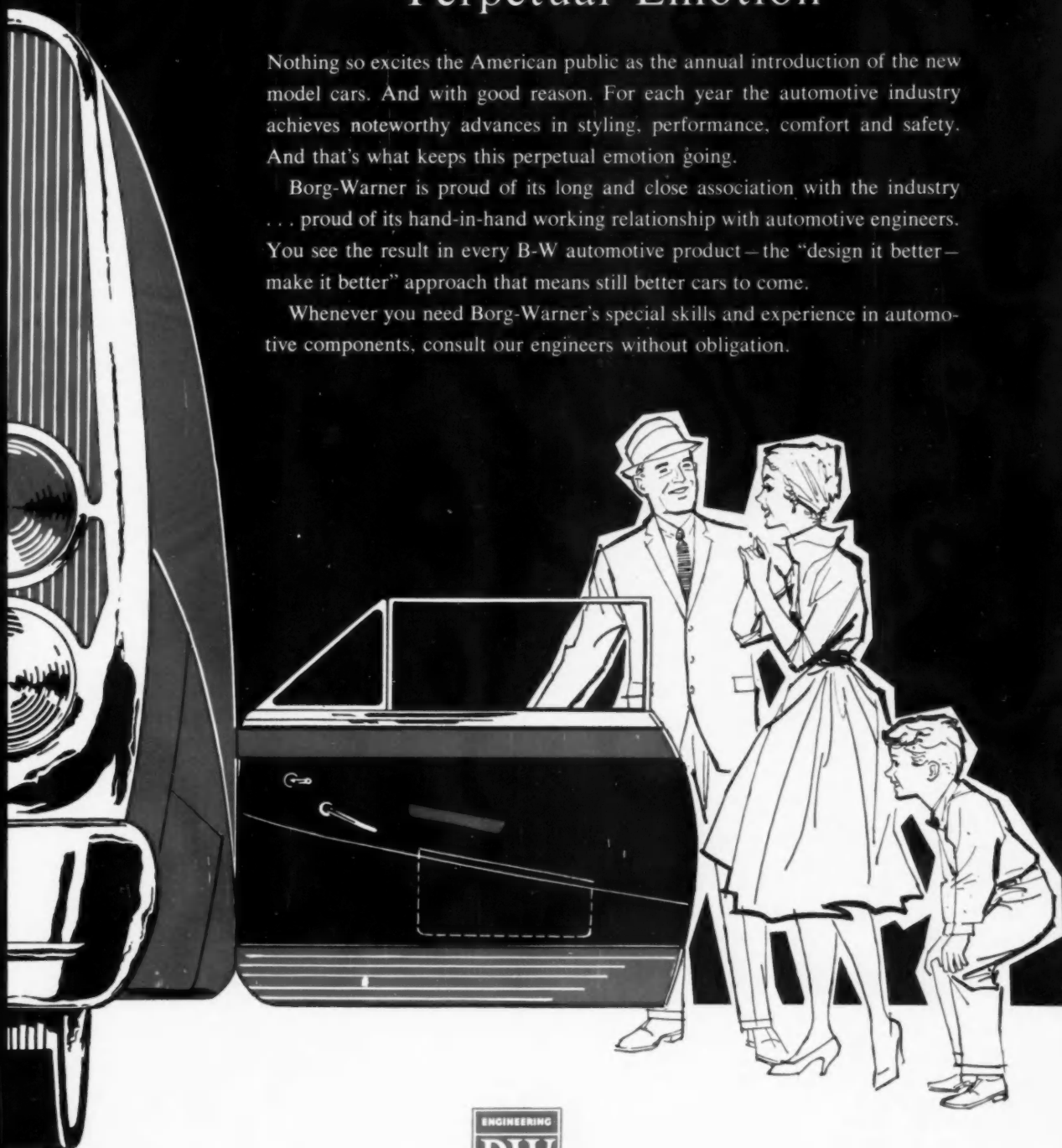
MUSKEGON, MICHIGAN

Perpetual Emotion

Nothing so excites the American public as the annual introduction of the new model cars. And with good reason. For each year the automotive industry achieves noteworthy advances in styling, performance, comfort and safety. And that's what keeps this perpetual emotion going.

Borg-Warner is proud of its long and close association with the industry . . . proud of its hand-in-hand working relationship with automotive engineers. You see the result in every B-W automotive product—the "design it better—make it better" approach that means still better cars to come.

Whenever you need Borg-Warner's special skills and experience in automotive components, consult our engineers without obligation.



DESIGN IT BETTER

MAKE IT BETTER

BORG-WARNER®

310 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS



Retards wheel spin in snow, ice, mud, sand or gravel



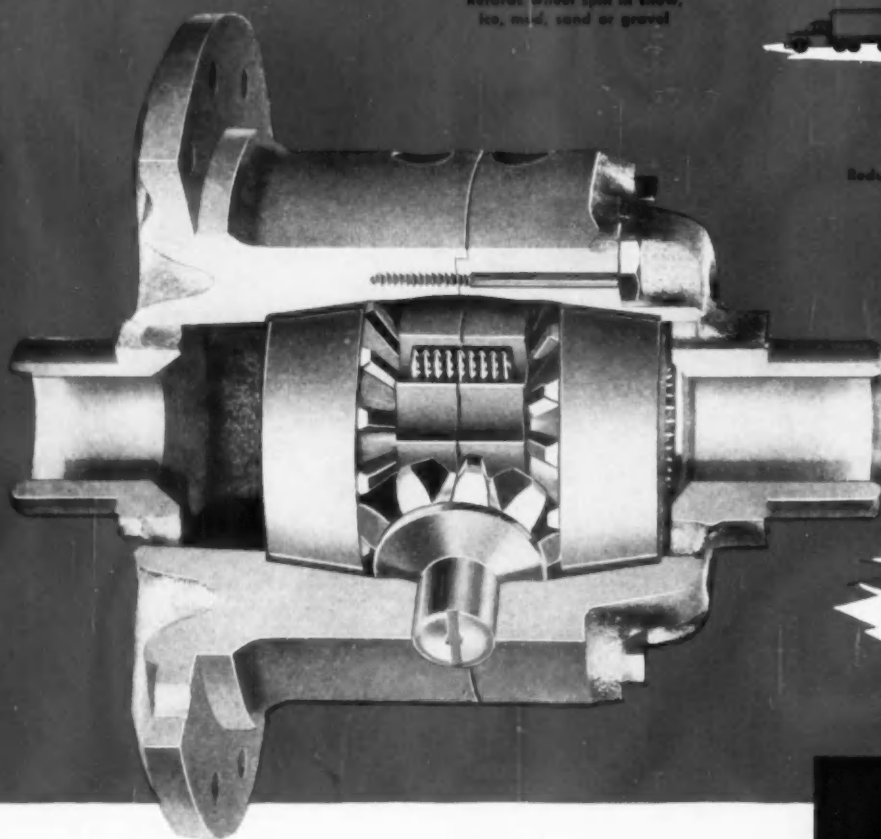
Reduces skidding on curves



Ends tire scuffing from wheel bounce



Reduces swerving on rough and high crowned roads



Announcing THE BORG-WARNER SPIN-RESISTANT PRE-LOADED DIFFERENTIAL

Makes all driving safer, surer, more economical for cars, trucks, tractors, lift trucks, other vehicles

This is the Borg-Warner Spin-Resistant Differential. With PRE-LOADED cone brakes and side gear thrust, it automatically provides internal resistance to overcome unequal traction at the rear wheels. Thus, *torque is smoothly transferred to the wheel with the greater traction.*

This B-W engineered unit has many advantages. *Simplicity*—fewer parts than other "locking" differentials. *Smooth operation*—in mud, snow, ice, sand, gravel or other poor traction conditions. *Pre-loading*—always provides a pre-determined amount of resistance to differentiation. *Interchangeability*—with existing conventional differentials.

What's more, the B-W spin-resistant differential *will not* become noisy, *will not* develop excessive backlash with wear, *will not* cause full locking of either axle shaft, *will not* interfere with normal steering.

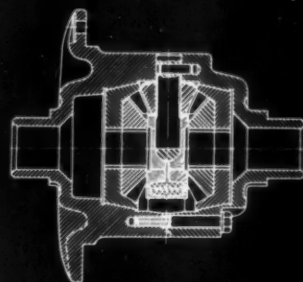
For full details, write, wire or telephone



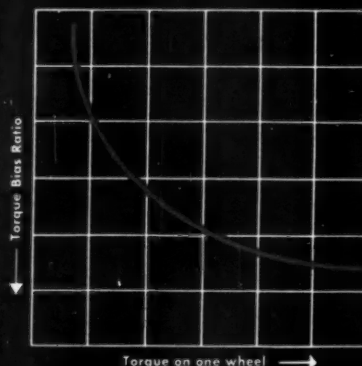
WARNER AUTOMOTIVE DIVISION
BORG-WARNER CORPORATION • AUBURN, INDIANA

Products of Experience

SIMPLICITY



HIGH PERFORMANCE

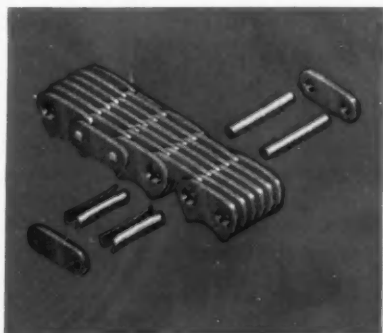




More than 80,000,000 durable Morse Timing Chains have been used by the auto industry. Now specified as original equipment for 3 out

of 4 passenger cars, Morse Timing Chains give car owners steady, reliable service—operate quietly and smoothly, with positive timing.

It's almost unanimous: 3 out of 4 1958 cars use Morse Timing Chain!



This new Morse Timing Chain, above, designed to meet the needs of higher-horsepower 1958 cars, features spring-bushing joint construction for longer service, smoother and quieter operation. The new bushing cuts joint vibration by reducing tendency to "whip," provides for take-up of slack, and serves as a damping device to minimize noise. Ask for Catalog C60-51.

The reason is simple: Precision-built Morse Timing Chain assures car owners of trouble-free timing for extra thousands of miles.

It's been performance-proved by more than 80,000,000 Morse Timing Chain installations on cars, trucks, and buses.

It pays to contact Morse on all your timing chain problems—original equipment or replacement. For complete information or engineering help, phone, wire, or write **MORSE CHAIN COMPANY, DETROIT, MICHIGAN; ITHACA, NEW YORK.** Export Sales: Borg-Warner International, Chicago 3, Illinois.

SERVING THE AUTOMOTIVE
INDUSTRY FOR OVER 55 YEARS

MORSE



*Trademark

new team!
in LP-Gas
Carburetion...



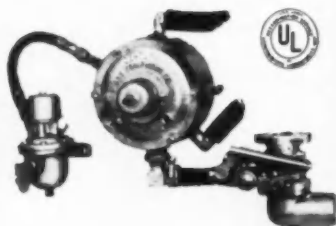
CENTURY

Marvel-Schebler

Follow the lead of 10 big manufacturers who changed to Century LP-Gas carburetion.

Century leadership is evidenced by the fact that 10 manufacturers are now installing Century LP-Gas carburetion as factory standard.

The big difference in Century carburetors is the metering valve which gives positive control of the gas regardless of changes in altitude, temperature or gas pressure. Century progressive jet carburetors are factory calibrated and set to the engine's performance curve. They provide easy starting, perfect idling and full power. They are available for every engine from 5 to 500 h.p.



Leader among Leaders!

A new champion in LP-Gas carburetion was born when Century joined Marvel-Schebler. Here is a combination of an outstanding carburetor design and a dependable factory carburetor service ready to furnish a balanced carburetion system exactly to your engine requirements.

Century now has the complete research and development facilities to build an LP-Gas carburetion system exactly suited to your engines. Each unit balanced in size and capacity. Each carburetor is factory calibrated and set to engine's performance curve. You get the ultimate in engine performance and dependability.



Demand the dependability of a complete Century carburetion system with metering valve control of combustion.

CENTURY
LP-GAS CARBURETION



Century Gas Equipment
 Marvel-Schebler Products Division, Borg-Warner Corp.
 625 Southside Drive, Decatur, Illinois

SPE Conference

(Continued from page 136)

it for heater housing insulation. A cushion of polyether foam has been employed under the carpeting of one car. The versatility of formulation in these foams is so wide that properties can be varied at will. This is of greatest importance in seat cushioning applications, particularly under confined conditions. New concepts of styling, which include full molded seats and individual bucket type seats, fit well into the versatility of polyurethane foams.

Silicone Foams

Developments in silicone foams were described by D. E. Weyer, Dow Corning Corp. It was noted that silicone foams offer a unique approach to the field of high temperature thermal insulation, their major asset being the ability to foam-in-place. Simple forms can be made from cardboard, tarpaper, or sheet metal even for complicated configurations. Latest developments include a self-expanding and curing silicone rubber which can be fabricated by molding to shape with or without pressure, knife or dip coating, continuous mixing or casting in place.

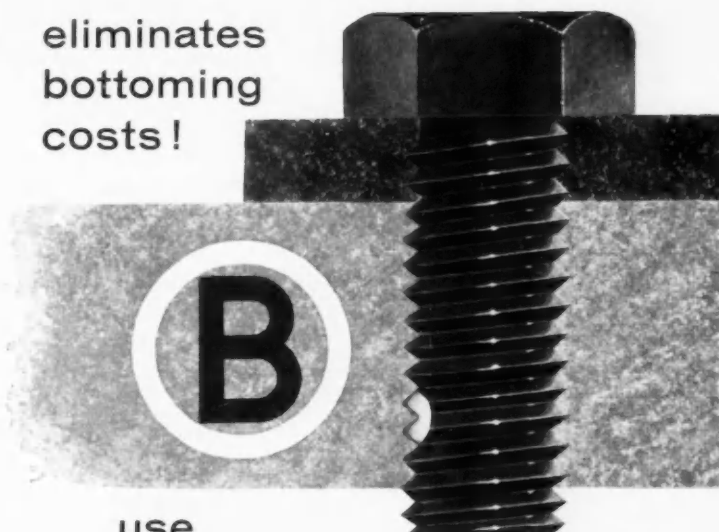
Epoxy Resin Foams

New in the field of foams are epoxy resin formulations described by W. H. Nickerson, DeBell & Richardson, Inc. They are thermosetting resins with complete resistance to all types of organic solvents and can take high temperatures without loss of physical properties. The foam has been used in making rather complicated patterns for foundry casting. For this purpose, it has many advantages due to the ease with which the material can be shaped with woodworking tools, knife, or sandpaper.

Automotive Trim

The place of plastics in automotive trim was discussed by R. McCullough, Ford Motor Co. Among the current applications are: vinyl-coated plastics for cushions and

eliminates
bottoming
costs!



use

NYLOK® fasteners

Now you can cut the cost of special set-ups, drill breakage, precision bottoming, tapping, and chip removal simply through the use of Ⓑ NYLOK® fasteners.

The illustration shows how the resilient Nylon pellet wedges load and non-load bearing threads tightly together in a stronger, leak-proof joint. In actual applications, drilling and tapping costs are cut drastically with still further savings realized through reduced production and assembly time.

Ⓑ NYLOK® Fasteners Seal As They Lock...without sealants

Ⓑ NYLOK® fasteners seal gas, oil, air and alcohol. Stay locked at any depth—need not be fully seated—don't vibrate loose. Yet, they can be removed and reused. Nylon insert is adaptable to any Ⓑ threaded fastener. Won't shrink, dry, age or turn brittle. Unaffected by temperatures to 250°F...cannot damage threads or seating surfaces. Simplifies fast assembly. Perfect for hopper feed and power driving.



Compare the features of NYLOK with those of other fasteners. Write for literature detailing advantages. Many other advantages of Ⓑ NYLOK fasteners are being realized in a variety of applications. It will pay you to get the facts.

© "THE NYLOK CORPORATION"

BUFFALO BOLT COMPANY

Division of Buffalo-Eclipse Corporation, NORTH TONAWANDA, N. Y.

• 3 convenient service centers

WESTERN OFFICE
Chicago
Harrison 7-2179

EASTERN OFFICE
New York City
REctor 2-1888

CENTRAL OFFICE
North Tonawanda
JACKson 2400 (Buffalo)

SELF-LOCKING
SELF-SEALING



NYLOK® fasteners

seat backs; headlinings of cloth-back vinyl or woven plastics and even some examples of molded linings; door and side panels; arm rests; luggage compartment linings; convertible tops of multi-colored vinyl. His paper also covered examples of fabrication methods employed at Ford.

Radioisotopes in Industry

Industrial applications of radioisotopes were discussed by a number of specialists in this field of ac-

tivity. Others contributed bits of information as to the application of this technique in certain specific areas such as vulcanization. The general reaction on the part of users is that when it comes to irradiation techniques the art is still too new and the capital investment much too high to be practical at this point.

Uses for Radioisotopes

Utilization of radioisotopes was covered by Paul C. Aebersold,

Atomic Energy Commission. It is based upon three principles: the use of radiation to trace materials; materials that affect radiation; and radiation that affects materials, the latter being the basis for the use of radioisotopes by the plastics industry. One application that merits study is in the vulcanization of tires. This was discussed by another author. Previously heat and catalysts were used to promote chemical reactions. Radiation is a new way of adding energy to a system.

Long chain polymers, he stated, show marked changes in their properties after irradiation. Radiation initiates cross-linking between neighbor molecules of a polymer. Side chain bonds can be broken by radiation and immediately join with similarly opened bonds in adjacent molecules. A quite rigid, three-dimensional structure is formed having different strength, heat resistance, and a variety of other properties differing from the original molecule.

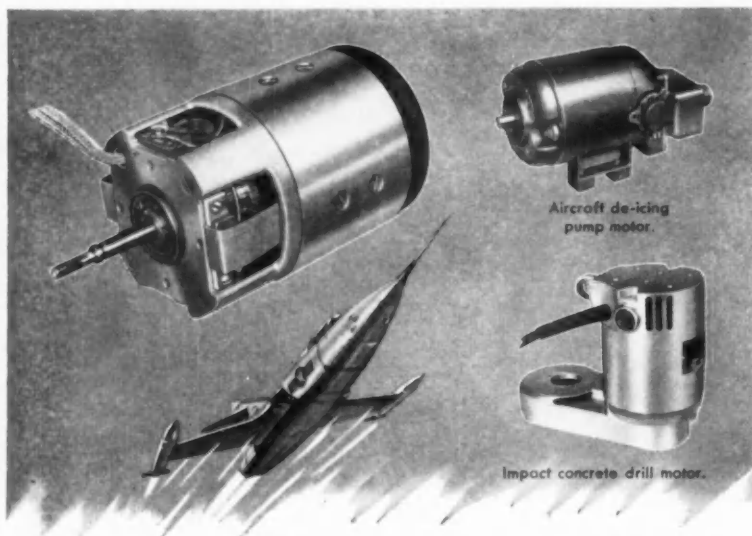
Atomic Radiation of Plastics

R. F. Boyer and Robert Medfries of Dow Chemical Co. also discussed the role of atomic radiation in plastics. They conclude that radiation will play an important role in the future in the areas of polymerization, vulcanization, and graft polymerization of plastics. The major problems at the moment are: the cost of radiation vs. cost of chemical catalysts; convenience, speed, feasibility, and property advantages as compared with chemical catalysts; and the largely unknown industrial technology at the present time.

Vulcanizing of Tires

Mention has been made of the use of irradiation in the vulcanizing of tires. On this subject, R. G. Bauman, The B. F. Goodrich Research Center, concludes that most of their work has foundered on the shoals of economics. He points out that irradiation is but another way of doing the job and it must compete with conventional methods on a cost basis. At the moment he feels that the enormous capital costs involved outweigh the possi-

(Turn to page 149, please)



Passes Tests With Flying Colors

MILITARY AIRCRAFT MOTOR

... equal dependability for your product

One of the recent Lamb Electric developments is a motor to drive submerged pumps on military aircraft—for transfer of fuel from reserve to engine tanks.

For such an important application, motor reliability far beyond that normally called for was needed. To insure this degree of reliability in its actual operation of driving the submerged pump, test requirements for the motor were exceptionally rigorous.

As the result of advanced engineering and design, greatly increased brush life, and ability to operate at extremely high temperatures and withstand severe shock tests, the motor passed gruelling tests with flying colors.

The skill and experience exemplified here is available to your company to provide dependable power for your new or redesigned products.

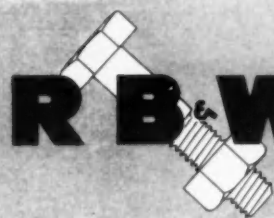
THE LAMB ELECTRIC COMPANY • KENT, OHIO

A Division of American Machine and Metals, Inc.

In Canada: Lamb Electric—Division of Sangamo Company Ltd.—Leaside, Ontario

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER **MOTORS**



FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By John S. Davey

Select proper bolt diameter

An erroneous rule of thumb worth forgetting is that no bolt under $\frac{3}{8}$ " should be used where fastened members are under stress. Yet bolts $\frac{1}{2}$ -inch and smaller take plenty of external loading.

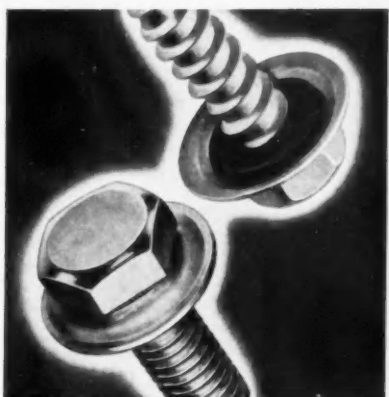
HOW TO LOOK AT IT

Primarily, you have to satisfy the stress requirements . . . the load. So select bolts on that same basis: the actual strength to sustain that load.

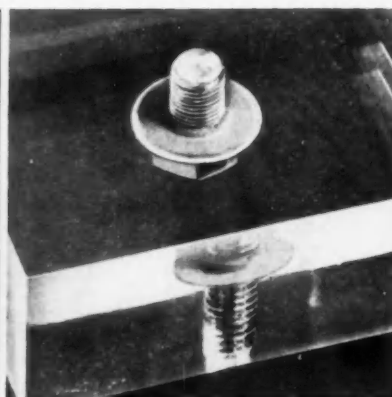
Calculating the strength requirements will tell you what bolt tensile, size, and number you need. If smaller bolts suffice, use them to avoid the penalty of overdesign. Holes can be smaller which means faster drilling and tapping. You have a chance to save materials since with smaller bolt holes, fastened members can often be made smaller too. You may also be able to standardize on a single size, saving assembly-line time.

SIZE VS. SAFETY

Remember that for a given grade of material, size tells you *capacity* of a bolt, not its *safety*. If you *tighten* a bolt to capacity, then you get safety. That's why a smaller bolt properly tightened is better and safer than a larger bolt sloppily tightened, especially where the loads are dynamic. Obviously, you reduce risk of under-torqued bolts as you reduce their size.



The new RB&W "SPIN-SEAL" fasteners have spring-type washer with adhering flow-in seal . . . pre-assembled to standard machine or tapping screw.



Flow-in sealant is confined by washer. Note how seal fills space under head and flows around and into threads in tightened SPIN-SEAL screw.

New SPIN-SEAL* screws give leakproof fastening

Here is a new type of composite fastener that seals by means of a unique flow-in sealant and washer.

ASSURES TRIPLE SEAL

Concave in shape, the heat treated springy washer confines and controls the flow of sealing compound. Tightening the screw forces sealant into various spaces around (1)



When screw is tightened the compound seals clearance hole and top thread; between washer and surface; between head and washer.



threads, (2) head and (3) clearance hole to give hermetic sealing.

The washer has ability to conform to curved surfaces and still seal securely against hydrostatic

pressures and wind driven water. Its spring tension and flat rim give the added advantage of dynamic metal to metal seal.

ONLY THE SCREW TURNS

Washer does not turn with the screw. This prevents twisting or tearing the sealing "gasket", mar-ring of polished surfaces, or gouging of painted finishes.

The flow-in gasketing compound is plastic rather than elastic. Stable and non aging, it won't split or ozone-check under pressure. It gives controlled flow into clearance spaces. Compounds are available to seal out water or oil.

Send for Bulletin SS-1 which gives details on RB&W "SPIN-SEAL" fasteners. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

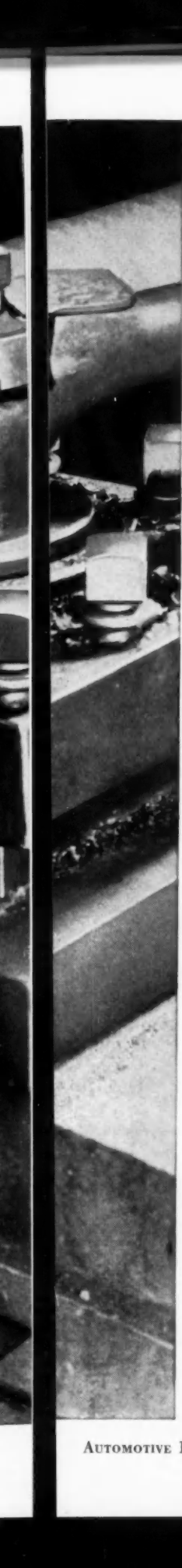
© T.M.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.



Roughing and finishing this large motor shaft, a modified Standard Carbide Tool (tipped with Grade 350) boosted the number of linear inches cut by 30% over other tools.

SETUP: Material - AISI 1045 modified (hot-rolled). Speed - 300 SFPM. Feed - 0.020 inch. Depth of cut - 1/16 to 1/8 inch. Coolant - Yes.



3 reasons why industry specifies more Carboloy[®] braze-type tools than any other brand

1 Consistent, record-breaking performance

Tough jobs, like the one at left, are the real test of a tool's performance. And in plant after plant, Standard Carboloy Tools have proved that they deliver maximum production — at lowest cost per piece. They're made by the company that pioneered "standards." Their shanks are of the finest cold-drawn steel. Their carbide edges are automatically diamond-ground for accurate machining.

2 Complete range of styles, sizes, grades

Standard Carboloy Tools are available in thirteen styles, hundreds of sizes. Used "as is" or adapted to specials, they can handle up to 80% of all single-point jobs — from rough turning to precision threading. They're available with tips of Carboloy Extra-Performance steel-cutting grades 330, 350, and 370. Or, with carbides for cast irons, super alloys, nonferrous and nonmetallic materials.

3 Immediate delivery from local stocks

There's no waiting for "long distance" delivery when you order Standard Carboloy Tools. Authorized Distributors of Carboloy cemented carbides in 140 cities keep full stocks on hand for off-the-shelf delivery. Your local Carboloy Distributor is listed in your Yellow Pages. Call him today. Or write: *Metallurgical Products Department of General Electric Company, 11151 E. 8 Mile Ave., Detroit 32, Michigan.*

CARBOLOY[®]
C E M E N T E D C A R B I D E S

GENERAL  ELECTRIC

FROM **Firestone** THE

NEW NAME IN ALUMINUM:

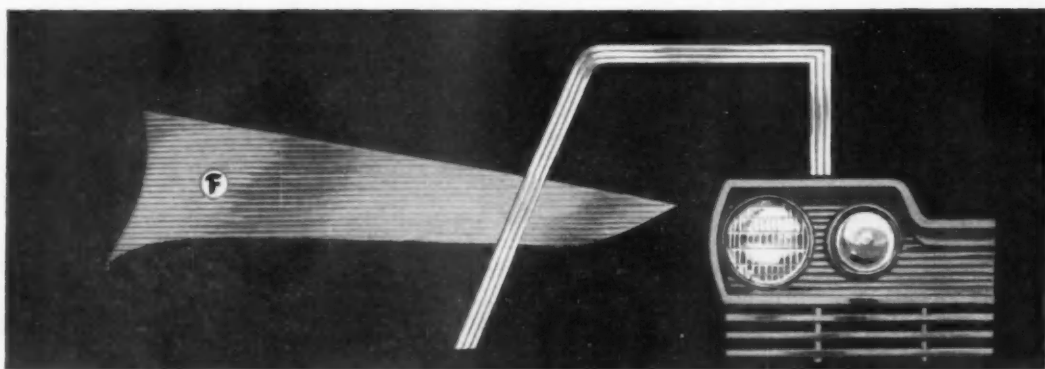
THE APPEAL OF COLOR

An illustrious name has been added to the roster of those who transform the colors of aluminum into automotive sales appeal. The skillful craftsmen of Firestone Steel Products Company now fabricate from Alcoa® Aluminum gleaming parts like those below . . . in the lovely hue of natural aluminum, in imperishable gold and other colors of the rainbow.

Firestone's aluminum fabricating facilities are among the most modern in the country . . . processing extrusions, stampings, roll-forms, embossings, etchings and—most important to Detroit's astute merchandisers—the magical process of color anodizing.

Alcoa, we are proud to report, had a hand in bringing before Detroit these latest Firestone skills. Firestone's expert metal fabricators were able to draw heavily on Alcoa's intimate knowledge of aluminum and its behavior . . . a knowledge compounded through 69 years of intensive aluminum research and development.

Alcoa itself does not make automotive trim. But from our partnership with creative fabricators like Firestone have come the techniques that put aluminum's color, form and texture in every automobile made today.



ALCOA

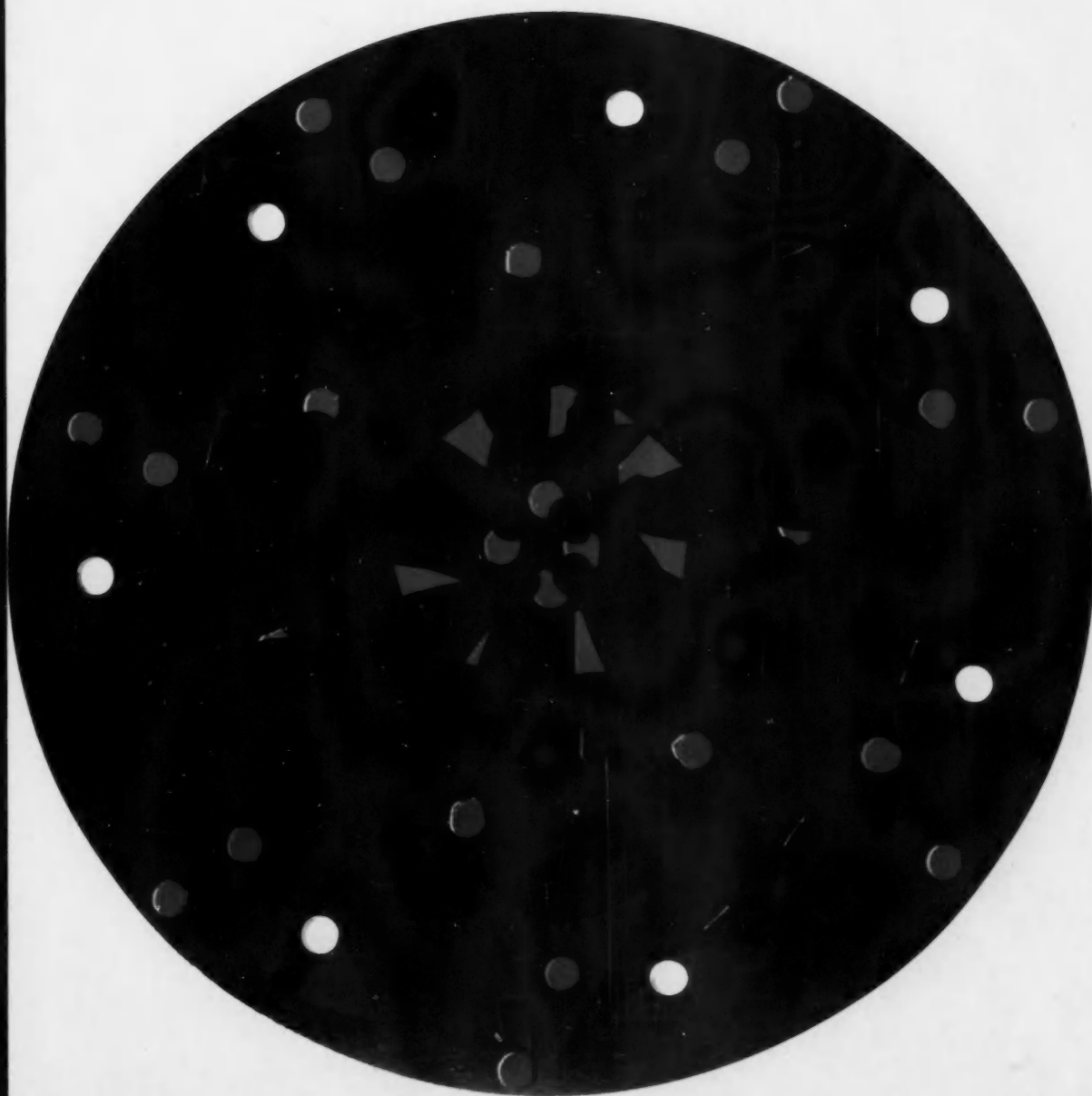


ALUMINUM GIVES EVERY CAR MORE GLEAM AND GO!

ALUMINUM IS COLOR...ALCOA IS ALUMINUM

Where color is integral to an idea, aluminum is your natural ally. It wears more coats more colorfully than any other metal. Alcoa's intimate knowledge of this most versatile metal is yours to share. See other side for details.

ALUMINUM COMPANY OF AMERICA



ALUMINUM IS COLOR: THE WONDERFUL PROCESS OF ANODIZING

One of the best known techniques for giving aluminum a protective finish is *anodizing*. The basic purpose of anodizing is to increase aluminum's resistance to corrosion and abrasion. Anodizing actually builds up an aluminum oxide coating electrolytically which gives aluminum a "built-in" armor hide that is part of the metal itself. It cannot chip or peel or flake off. Density and thickness can be controlled, depending on whether a hard, impenetrable finish or a softer, more flexible coating is desired. Furthermore, this armored hide resists corrosion from all but the most caustic alkaline agents.

COLOR IN ANODIZING

Anodizing does not arbitrarily alter the appearance of the metal, regardless of surface treatment applied. The crystalline cellular structure of the anodic layer, however, is highly receptive to an unlimited range of organic dyes and pigments. The coloring agent permeates

the oxide layer before the surface is sealed, thus actually becoming part of the metal itself. Sealing is accomplished with a solution of boiling metal acetates. Colors cannot chip off or peel away.

FACTORS AFFECTING APPEARANCE

Appearance of the anodized metal can be controlled in a number of ways. Choice of alloys has a strong influence on final appearance. Silicon alloys impart a gray tone, chromium a pleasing yellow tint, and manganese a brownish coloration. High-purity alloys give a clear, transparent finish; translucent or opaque finishes result from constituents introduced in the alloy. If colored anodic coatings formed in sulfuric acid electrolytes are used, the aluminum takes on a unique metallic luster. Opaque anodic coatings are possible using chromic acid electrolytes to give deep, rich, solid tones. Multicolor effects are possible by masking the metal before coloring or dyeing. Lithograph-

ing, silk screening and other special processes are available.

ALCOA DEVELOPED ANODIZING PROCESS

Alcoa developed and patented the anodizing process under the trade name, Alumilite. We have worked extensively with different dyes and pigments and have developed a complete spectrum of colors for interior use. Other colors—such as gold—which are completely resistant to fading from sunlight and other atmospheric agents are recommended for outdoor exposure.

ALUMINUM WEARS A RAINBOW OF COLORS

Actually, aluminum can be colored more ways than any other metal. Its good forming properties, ready response to etchants and high adherence for inks and enamels make it a good base for all color treatments of the conventional type. With proper surface preparation, almost any type of paint, lacquer or enamel can be used.



GET MORE INFORMATION ON DESIGNING IN ALUMINUM

Write for Alcoa's inspirational bibliography which describes Alcoa books and films to help you design in aluminum. Aluminum Company of America, 2183 Alcoa Building, Pittsburgh 19, Pennsylvania.



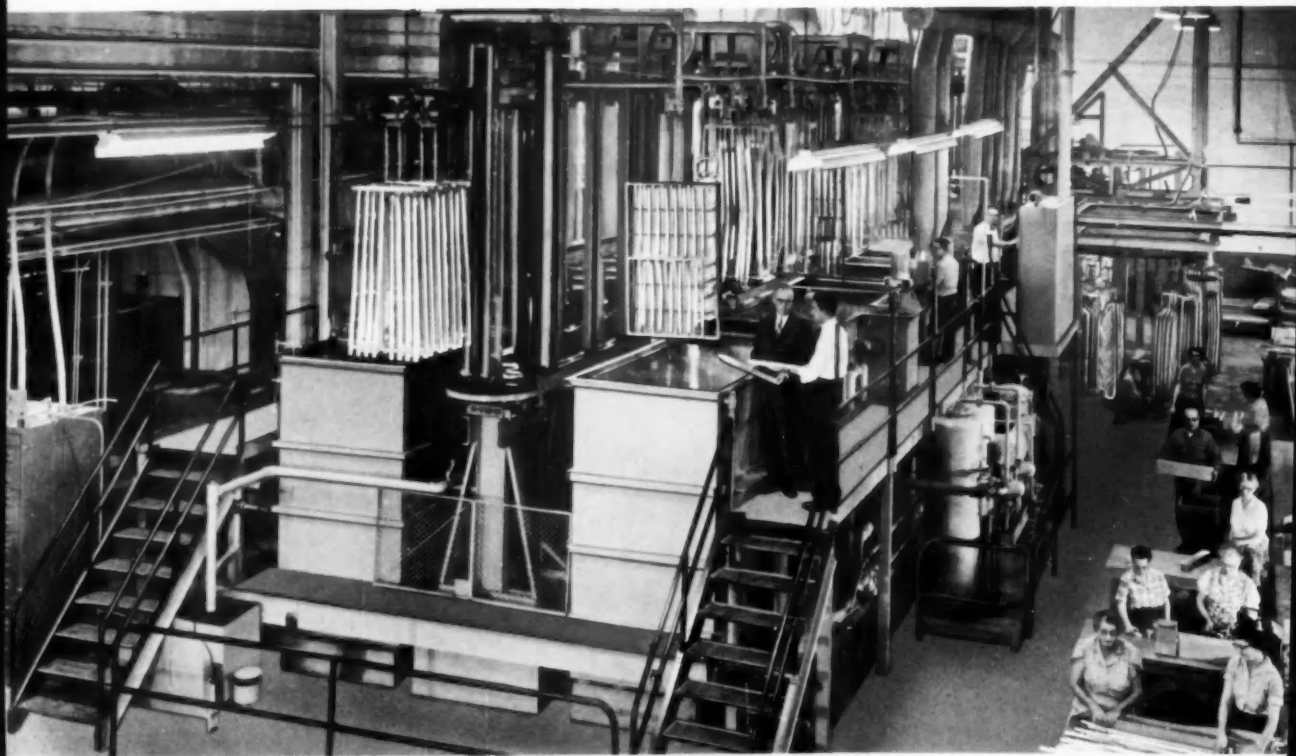
*Your Guide to the
Best in Aluminum Value*



"ALCOA THEATRE"

Exciting Adventure, Alternate Monday Evenings

NEW COLOR ANODIZING LINE AT FIRESTONE—one of the most modern facilities of its kind in the world. Alcoa teams up with such leading fabricators as Firestone to provide you with the latest and best in aluminum design and fabricating know-how. For more information write: Firestone Steel Products, Akron, Ohio.



SPE Conference

(Continued from page 142)

ble advantages of the new technique.

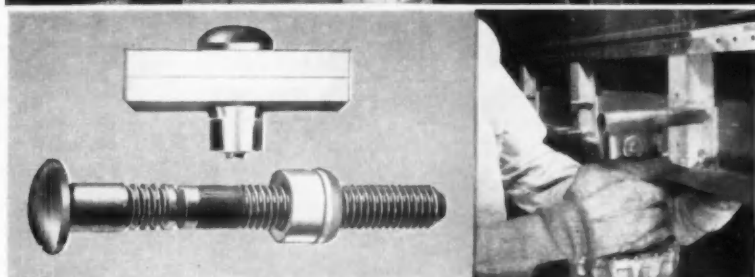
That epoxy tooling has made major gains in the motor car and aircraft plants has been generally known in recent years. A number of authors contributed summaries indicating the current status of the art as well as specific applications.

Plastic Tools at Ford

Case histories of some successful applications of plastic tooling were presented by Edsel Ruddiman, Ford Motor Co. At Ford these have included plastic models, spotting masters, development dies, checking fixtures, drilling fixtures, and some applications in conjunction with hard dies. He cited an example of adding an over-crown onto a large steel punch with an area of some eight square feet. This was done by preparing a suitable plaster mold and casting aluminum-filled epoxy resin into the cavity between the mold and the punch. Over 15,000 steel panels were drawn with this die before it was removed due to model changeover.

Plastic Tooling for Aircraft

Widespread employment of plastic tooling in the aircraft industries was described by Robert Voss, Warren Plastics and Engineering Co. Contour drill fixtures are being made of epoxy and glass. For drop hammer dies successful applications have been made of semi-flexible epoxy with a Kirksite core. Plastics have been most successful in the making of mock-ups. And it is also feasible to lay out the component parts of a large assembly on the mock-up, then make female skins of each part. Epoxy resins are widely employed for producing fixtures of all kinds. After years of experimenting, stretch press and drop-hammer dies have been developed successfully using a cast aluminum core with an epoxy facing. The most successful draw dies are being made by a pressure casting method using high temperature epoxy resins reinforced with glass fiber. (Cont'd, next page)



Townsend Lockbolts Provide Strong, Vibration-Proof Joints For Rugged Fruehauf Volume ★ Vans

Rugged, high-payload Volume ★ Vans are built using Townsend lockbolts† at critical points to provide the utmost strength. "Fruehauf uses lockbolts because they result in a uniform, high-strength, vibration-proof joint without need of skilled operators," says George Chieger, Executive Engineer.

Townsend lockbolts are easy to apply. The gun engages the pull grooves of the lockbolt. As the trigger is depressed, the work is drawn together with a high clinching action and the collar is swaged into the locking grooves of the pin, forming a permanent lock. The lockbolt pintail then is broken off at the breakneck groove, and ejected from the gun automatically. The entire

operation is fast, and requires no special training or skill.

Lockbolts also have advantages in service work, says H. J. Biers, Fruehauf General Service Manager, "When field repairs are required that necessitate removal of lockbolts, they always are replaced with comparable lockbolts. If a better fastener were available, Fruehauf would use it."

For a complete explanation of how Townsend lockbolts can help you to obtain stronger, longer-lasting joints, allow us to send one of our representatives. He can give you a complete demonstration right at your desk. Townsend Company, P.O. Box 237-CC, New Brighton, Pa.

†Licensed under Huck patents: RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049 and 2,754,703

THE FASTENING AUTHORITY

Townsend

COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry River Division • Santa Ana, California

SPE Conference

(Continued from page 149)

Plastic Patterns

That plastic core boxes and patterns have a bright future in the foundry industry was the theme of a paper by W. R. Weaver, Modern Pattern & Plastics, Inc. Improved materials promise an unusual future for epoxy resins, pro-

vided one uses a sound approach to justifiable applications.

Reinforcements for Premixes

W. O. Erickson, Barrett Div., presented a study of reinforcements for polyester premixes. He found that the primary contribution of sisal to physical properties is in increased impact strength. However, sisal should not be used if minimum water absorption is required or if the part is to be exposed to the weather for pro-

longed periods. Nylon fiber was found to contribute more improvement than sisal. Although Dacron in the 1-1/2 in. fibers was difficult to mix, mold and deflash, its contribution to increased impact strength was quite significant. Glass fibers were found to be the best all around reinforcement. It was noted that after about 10 to 15 per cent volume there is little improvement in properties with increasing glass content, due to degradation of the fiber during mixing.

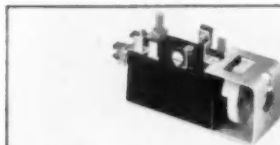
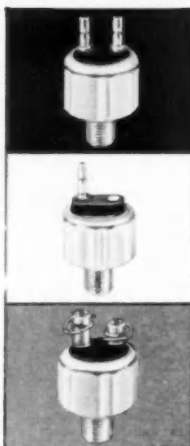
Melvin E. Nelson, Dow Corning Corp., reported that the wide variety of existing silicone insulation materials has been expanded by the development of two solventless resins characterized by low viscosity, long pot life, and easy application. In the cured state these silicone resins have good thermal stability, good resistance to moisture, and excellent electrical properties. These resins have applications in a large variety of electrical devices.

FASCO AUTOMOTIVE ELECTRICAL PRODUCTS

designed for today's
needs with tomorrow's
requirements in mind

Fasco products have been serving America's Automobile Industry for over 30 years, and serving them well. Today, as in the past, Fasco is responding to the ever-increasing demand with products designed and built to meet exacting industry needs . . . and will continue to respond with "look-ahead" designs to meet the challenges of the future!

HYDRAULIC
STOPLIGHT SWITCHES



HEADLIGHT SWITCHES

Leading makers of
America's cars and trucks
know through experience
that it pays to

CONSULT FASCO FIRST!



LOW OIL PRESSURE
WARNING SWITCHES



AUTOMATIC RESET
CIRCUIT BREAKERS



AUTOMOTIVE DIVISION
FASCO INDUSTRIES, INC.
ROCHESTER 2, NEW YORK

DETROIT OFFICE: 12737 PURITAN • PHONE: UN 17476

AIRBRIEFS

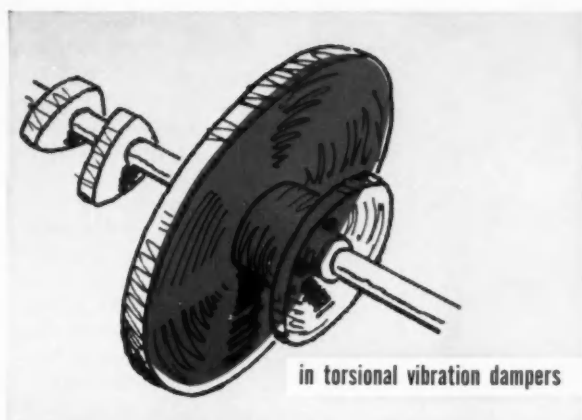
(Continued from page 96)

Fiscal Year	Air- craft	Miss- iles	Total A & M	All Procure- ment
1951	2.41	0.021	2.43	3.97
1952	4.88	0.169	5.05	11.47
1953	7.41	0.295	7.71	17.12
1954	8.33	0.504	8.83	15.95
1955	8.03	0.718	8.75	12.99
1956	7.15	1.16	8.31	12.18
1957	7.96	2.10	10.06	13.65
1958	7.50	2.90	10.40	13.84
1959	6.90	3.30	10.20	13.75

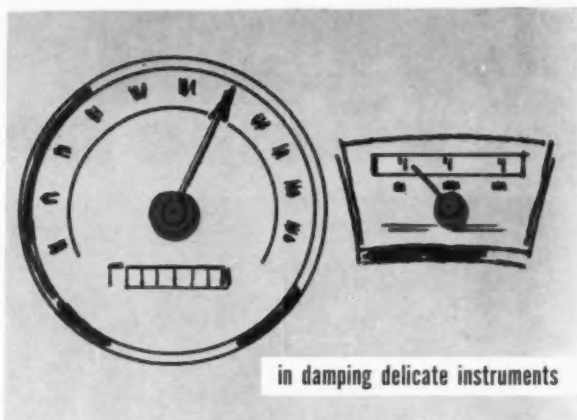
Note especially the budget figures underscored for 1959. More for missiles, less for aircraft. Here is another significant item. Of the new Department of Defense obligatory authority for research and development, missiles will receive \$513.7 million and aircraft only \$245.8 million. This is a strong indication of how things will go for 1960-1961 etc.

Tape Controlled Milling Machine

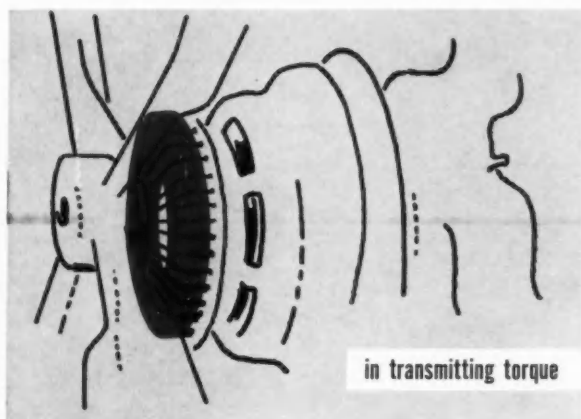
Magnetic tape is coded with instructions for automatic operation of milling machines. The numerical coding on the tape includes a description of the part, instructions to feed and speed rates re-



in torsional vibration dampers



in damping delicate instruments



in transmitting torque



in liquid springs

Silicone Fluids ASSURE UNIFORM PERFORMANCE DESPITE HEAT OR COLD

Dow Corning silicone fluids retain near-constant viscosity over a wide temperature span. Their effectiveness as damping media or coupling fluids is unimpaired by heat or cold . . . also true of their use in liquid springs. Silicone fluids are already helping automotive designers get better performance in such parts as those shown . . . future uses are almost limitless. Consider the unusual properties of these materials:

FOR DAMPING OR COUPLING Dow Corning silicone fluids offer serviceability from -130 to 400 F. Available in many viscosities, they show little change in damping or torque transmitting properties despite varying temperatures. These fluids are highly resistant to oxidation and to

viscosity breakdown due to shear. As a result, they give very long service without replacement.

FOR LIQUID SPRINGS Dow Corning silicone fluids combine a high degree of compressibility, low coefficient of expansion, and flat viscosity-temperature slope.

WRITE TODAY FOR MORE EXTENSIVE INFORMATION

DEPT. 062



Dow Corning CORPORATION
MIDLAND, MICHIGAN

MIDLAND

WELDING NUTS



**take seconds to apply...
save hours of labor!**

If you make a component part of an ultimate metal assembling operation requiring bolting in hard-to-get-at places, Midland Welding Nuts may well be the answer to simple, secure fastening later on. The practical Midland method anchors the nut in the exact location, ready to receive the bolt. There's no guesswork and cross-threading becomes impossible.

It's easy to apply Midland Welding Nuts.

Just insert the collar in the hole for bolt or screw, resistance-weld the nut in place, and the nut is anchored for the life of the job. Nuts can be automatically fed to the welder to save time.

Midland Welding Nuts assure close fit of metal parts. They can't work loose, causing annoying rattles. Also, parts can be removed easily and quickly for replacement or repair without threat of losing nuts. Assembly workers prefer them because they turn stubborn, difficult jobs into simple, easy to handle projects, often converting two-man tasks into one-man operations.

**MIDLAND-ROSS
CORPORATION**

Executive Offices: Cleveland 1, Ohio

Formerly
THE MIDLAND STEEL PRODUCTS COMPANY
Cleveland • Detroit • Owosso, Michigan

And
J. O. ROSS ENGINEERING CORPORATION
New York City, N. Y.

Including John Walbridge Corporation • Midwest Fulton Corporation • Ross Engineering of Canada, Limited
Andrews & Goodrich, Incorporated

quired for machining and control of other automatic services, such as coolant for the cutters and cutter head changes.

A special numerical director unit to numerically code the tape is a Giddings & Lewis unit, which costs \$235,000 each. One such numerical director unit has been installed at Convair in San Diego. It is sponsored by the United States Air Force and is the only such numerical director on the West Coast. Convair will prepare magnetic tapes with the numerical director for use by Boeing, Douglas, Lockheed and Rohr aircraft firms using tape-controlled machines on military contracts.

Executive Jet Airplane

Beech Aircraft Corp., Wichita, Kan., has announced a package price of \$210,000 for the world's first executive jet airplane. The aircraft is a high performance, four-place model, designated the MS 760.

Beech will market this jet airplane in the United States and Canada under license by the French manufacturer, Morane-Saulnier Co., of Paris, France.

The price now quoted is \$90,000 lower than the tentative price quoted in 1955 when Beech first demonstrated the plane in North America. The MS 760 will have American-made instrumentation and will feature cabin pressurization as standard equipment. The aircraft is now in quantity production in France. It is powered by two Turbomeca Marbore IIC jet engines. High speed will be a little over 400 mph and cruising speed 350 mph, with a cruising range of approximately 1000 miles. Weight is 7725 lb.

Economy North Atlantic Service

A new economy service across the North Atlantic will begin on April 1, 1958 at fares 20 per cent below those of tourist class.

For the New York to London route, one fare will be \$252, and the round trip fare \$453.60. Agreement on the new fares and this economy service was recently an-

(Turn to page 156, please)

At Westinghouse, production men agree on economy of Wean coil processing

Until recently, the Electric Appliance Division plant of Westinghouse Electric at Columbus, Ohio was supplying its production lines with steel purchased in sheet form and individually resquared. Some 75 sheet sizes had to be stocked to meet varying requirements.

The installation of Wean slitting and shearing lines in August, 1957 was made after a careful cost analysis of this production process. Now, after five months operating experience, here is how production management at this Westinghouse plant summarizes the advantages of the Wean coil processing system:

Materials Savings: in addition to the initial savings realized by the purchase of coil rather than sheet, scrap is reduced by the close control and accuracy possible on Wean slitting and shearing equipment. Coil is slit in a variety of widths, from 3 to 48 inches, to supply both the shearing line and press lines, now being coil-fed.

Inventory Savings: 3 or 4 standard coil sizes now provide the production flexibility for which 75 sizes of mill-prepared sheet were previously required. In addition, prime plant space for sheet production and storage has been reduced and inventory turnover increased.

Low-Cost Versatility: differing assembly line requirements for sheet are now met quickly and easily, without production delay or the expense of special purchases.

The mechanized handling of metal possible with the Wean slitting and shearing lines also has reduced direct labor costs, freeing men for work in other production departments. And the production rate of the Wean system is more than adequate to match the plant's usage of coil and sheet: in one three-day period, 350 tons of coil were processed on the shearing line.

If you use sheet steel in quantity, it's likely that these same savings could result from your plant's use of Wean slitting and shearing equipment. One of our experienced sales engineers will be glad to explore with you the economics of processing from coil to fill your production requirements. May we hear from you?



Mr. M. W. Stretch, right, of the Manufacturing Planning Department, and his assistant, Mr. M. Avery, discuss Wean's slitting line "after hours."



WEAN

WEAN EQUIPMENT CORPORATION

CLEVELAND 17, OHIO

Detroit • Chicago • Newark

TROUBLE FREE *with thousands in use*



WIRE INSERTS PUT CAST IRON WEAR IN TOP RING GROOVE

G and E Wire Insert Piston before machining (left) and after ring grooves are cut (right) showing how the steel wire forms a tough wear-resistant surface on both faces of top ring groove. The ferrous plug molded in the head (for diesel pistons) prevents burning through head and lengthens diesel piston life!

G and E WIRE INSERT PISTONS

- ★ **Low initial cost—
Low cost per mile**
- ★ **Amazing increase
in piston life**
- ★ **Maintains
new engine power
and performance**

GET THE G AND E WIRE INSERT STORY—It will save piston money, maintenance costs, and cut operating costs.

With the thousands of G & E "Wire Insert" Pistons in use for periods up to 3 years—NOT A SINGLE FAILURE of the "Wire Insert" has been reported to us. The "Wire Insert" greatly reduces top ring groove wear and increases piston life. It stays put—DOES NOT COME LOOSE! It can never cause internal engine damage that results in break-downs on the road and emergency overhauls.

The "Wire Insert" piston design—exclusive with G & E—combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove. No noticeable increase in weight—no interference with heat flow—and the cost is barely more than ordinary alloy pistons.

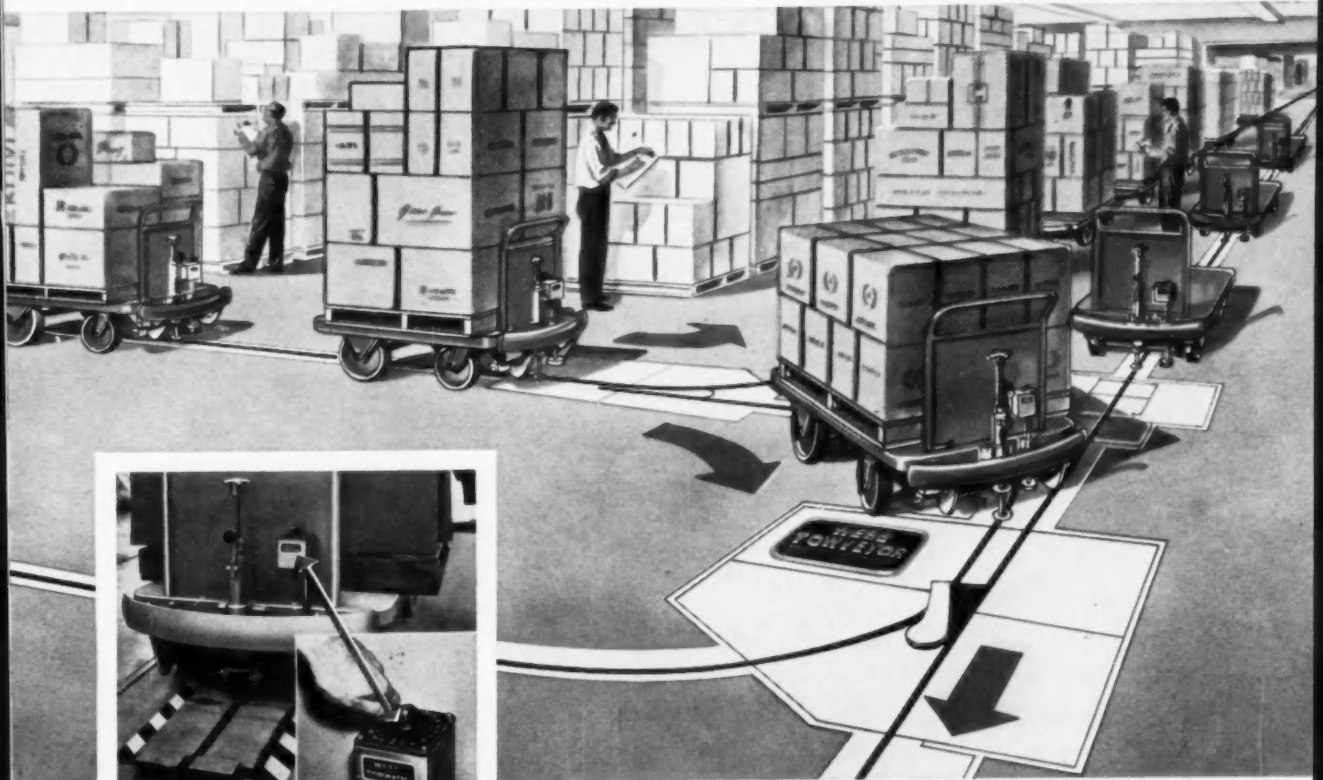
You get longer piston wear at lower cost because G & E Wire Insert Pistons have a pre-shaped steel wire cast right in the piston wall where the top ring is located. When the grooves are machined, this tough wire is cut, exposing the closely spaced hard surfaced bearing points on top and bottom faces of the groove.

GILLETT AND EATON, INC. 841 DOUGHTY STREET • LAKE CITY, MINN.



ESTABLISHED 1868

FIRST Electronically Controlled Towveyor . . .



Electronically controlled switching station—setting of "Towmatic" selector switch on each tow truck actuates Towveyor switches. Thus, trucks carrying finished products are automatically sent to shipping center and all other trucks are diverted to Towveyor at right.

Slashes Handling Costs . . .

Prevents Traffic Snarls . . . Speeds Production

Johnson & Johnson, in designing their "Plant of Tomorrow", gave major consideration to efficient materials handling. Required was a handling system providing: lower handling costs—smoother traffic flow—increased production—reduced manual handling—integration of materials movement in and between three buildings—automatic delivery of a variety of materials to many locations.

After intensive study of a number of handling methods, J & J selected a Webb electronically controlled Towveyor as their basic materials handling system . . . it filled their requirements.

In fact, all materials handling, in the two manufacturing buildings and shipping, centers around this 3624 foot Towveyor. To provide electronic control for movement

of materials, each tow truck is equipped with a 19-station Towmatic selector switch—each station representing a different location in the plant. Thus, by simply flipping Towmatic switch to desired station and lowering tow pin into Towveyor slot, the tow truck is started on its way—electronics take over and materials automatically travel to their destinations.

Two other Towveyors located in shipping center wind through order-picking areas to provide at-hand-convenience for personnel filling customer orders. Towtrucks carrying filled orders are placed on these Towveyors for unescorted travel to loading dock. By automatically performing the multiple materials handling operations required in manufacturing, warehousing and shipping, Towveyors at J & J reduce manual handling—lower operating costs—speed production.



JERVIS B. WEBB COMPANY
SPECIALISTS IN CUSTOM CONVEYOR SYSTEMS
8937 ALPINE AVENUE • DETROIT 4, MICHIGAN

FACTORIES: DETROIT • LOS ANGELES • ATLANTA • HAMILTON, ONT.,
CANADA • ENGLAND • FRANCE • BELGIUM • AUSTRALIA

For a detailed description of the Johnson & Johnson Towveyor system and its many benefits, write for 12-page Bulletin 28.

Webb in-floor Towveyor and overhead Tow-Conveyor systems are completely described and illustrated in Catalog 157—write for your free copy.



(Continued from page 152)

nounced by the International Air Transport Association. Seating accommodations on the economy service will be less spacious than offered in the present tourist class. It is the hope of the international aircraft carriers that the new economy service will make available trans-Atlantic transportation to a new class of potential customer. Government approval has to be obtained before the new fares become effective.

BUSINESS PULSE

(Continued from page 98)

so the question arises as to whether consumption expenditures may not weaken significantly if the recession persists for any considerable length of time.

Secondly, the implication that the decline in fixed business investment may be short-lived and limited is far from being regarded as reason-

able by many analysts. The whole postwar period has been characterized by enormous spending in this area, partly in response to unusual stimuli such as rapid tax write-offs. The consequence is that there is believed to be excess capacity in many lines today, and it is by no means self-evident that this capacity can be quickly absorbed to provide the basis for another spurt.

Thus, the optimism of the President's Economic Report notwithstanding, it seems doubtful that the issue of an early upturn versus an extended decline has really been resolved as yet. The next several months will probably be of critical importance in determining the outcome. During this period, business statistics, which are subject to a time lag, are likely to look even more unfavorable than they have looked to date. This will provide a test for consumer and business confidence.

Developments in Washington

Much of this stabilization of sentiment probably reflects developments in Washington. First of all, it seems likely that the optimism of the President's Economic Report has been contagious in some degree. And undoubtedly the fact that the President in submitting the Report made a pledge that the policies of the Government would be directed to stabilizing and stimulating the economy also helped. Secondly, it seems probable that the Budget Message had a bolstering effect upon sentiment, since it disclosed that, for the time being at least, military urgencies will override the objective of a balanced budget. From the standpoint of business activity, this could be stimulating, and this possibility has been recognized and may well account in part for the firming of sentiment which seems to have occurred.

Thirdly, the additional steps taken in the direction of an easier money policy by the Federal Reserve during January almost certainly had a favorable effect upon

(Turn to page 159, please)

ROCKFORD



MORLIFE® CLUTCHES

Control Power Better in the Heaviest-Duty Machines

ROCKFORD Over-Center CLUTCHES, equipped with MORLIFE clutch plates, provide 100% more torque grip than previous type clutches of equal size. This permits the use of smaller diameter clutches. Easier operation is accomplished by reducing the required engaging pressure. 50% better heat disposal avoids down-time caused by burned or warped plates. Numerous field records prove that MORLIFE clutches operate 400% longer without plate replacement or adjustment. Let these NEW type clutches help improve the operation of your heavy-duty machines.

SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES



Small Spring Loaded



Heavy Duty Spring Loaded



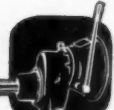
Oil or Dry Multiple Disc




Heavy Duty Over Center



Power Take-Offs

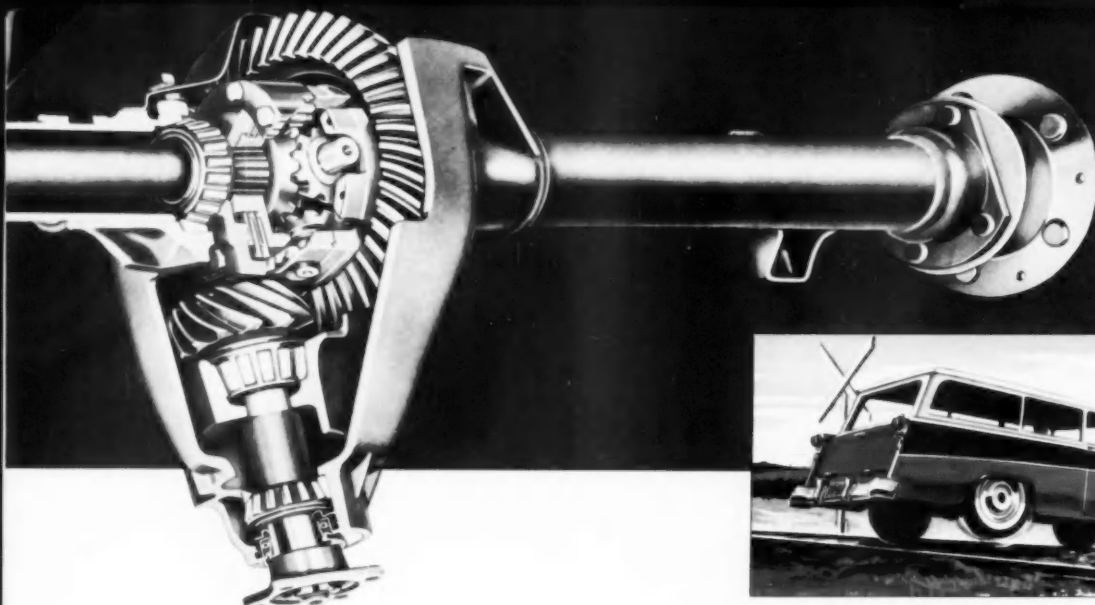


Speed Reducers



**One car went
up the hill...
the other
swerved into
the ditch**

*Non-Slip
Differentials provide
the outstanding
safety feature
of 1958...*



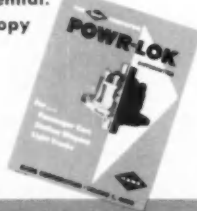
Sell Non-Slip Differentials...

you'll sell more cars in 1958

Ordinarily, if one of your wheels can't get traction . . . you're stuck. That's because with conventional differentials all the power goes to the wheel that has no traction. The result . . . you just spin your wheels. But, with Non-Slip Differentials, power is delivered to the wheel that has the most traction. So if either wheel can catch hold, there's no slipping, sliding, wheel-hopping, or getting stuck. You're safer in a car with Non-Slip Differential.



FREE This 12-page booklet is a complete and well-illustrated explanation of Spicer's Non-Slip Differential. Write for your copy today. No obligation.



With Non-Slip Differentials, dangerous car swerve and unbalance caused by wheel-hop and spin on rough, bumpy roads is ended, because the power is immediately delivered to the wheel with the most traction.



Mud and sand won't stop you—if either rear wheel has traction. Non-Slip Differentials power you right through muck and mire that stops conventional differentials cold.



If either rear wheel can catch hold, Non-Slip Differentials prevent slipping, sliding on icy or wet pavement. Puts an end to getting stuck in driveways, or at curbs.

DANA CORPORATION • Toledo 1, Ohio

DANA PRODUCTS Serve Many Fields:

AUTOMOTIVE: Transmissions, Universal Joints, Propeller Shafts, Axles, Power-Lok Differentials, Torque Converters, Gear Boxes, Power Take-Offs, Power Take-Off Joints, Clutches, Frames, Forgings, Stampings.

INDUSTRIAL VEHICLES AND EQUIPMENT: Transmissions, Universal Joints, Propeller Shafts, Axles, Gear Boxes, Clutches, Forgings, Stampings.

AVIATION: Universal Joints, Propeller Shafts, Axles, Gears, Forgings, Stampings.

RAILROAD: Transmissions, Universal Joints, Propeller Shafts, Generator Drives, Roll Car Drives, Pressed Steel Parts, Traction Motor Drives, Forgings, Stampings.

AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Joints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings.

Many of these products manufactured in Canada by Mayes Steel Products Limited, Merrilton, Ontario



BUSINESS PULSE

(Continued from page 156)

sentiment. This is not to say that either the reduction of margin requirements for stock purchases or the approval of a further $\frac{1}{4}$ per cent reduction in the discount rate will produce really dramatic results. What is important, however, is that these steps serve to make more explicit the direction and intent of Federal Reserve policy, especially since monetary officials permitted member-bank reserve positions to ease quite significantly in January. In the month or so which followed the November reduction in the discount rate from $3\frac{1}{2}$ to 3 per cent, it was sometimes asserted that the Federal Reserve intended to restrict itself to psychological action, since it pursued a relatively cautious policy respecting reserves. Now the policy of ease has clearly become more active, and to those who have faith in the efficacy of monetary policy this has been reassuring.

...

Ford Boosts Tractor Output; Predicts Good Sales in 1958

Ford Motor Company's Tractor and Implement Div. production has been boosted by $33\frac{1}{4}$ per cent since last October and the division is confident that 1958 will be a good sales year.

Division general manager Merritt D. Hill said that in 1957 sales showed a 19 per cent increase over 1956. With the '58 line of products, he said, the same improved level should hold steady through the year.

Ford plans to bring out "several" new pieces of farm equipment during 1958 to add to the current line.

The Tractor and Implement Div. head believes that farmers will invest a little more in their production equipment in 1958 and less in personal-use items.

Willys Jeep Will Be Built By New Australian Company

The Australian government has approved a plan for the manufacture of the Willys line of four-wheel drive Jeeps in Australia.

A new firm organized to manufacture the vehicles—Willys Motors Australia Pty., Ltd.—will be owned

one-half by Willys and one-half by the Australian distributor for Willys-Overland Export Corporation. The new manufacturing company has an authorized capital of one million Australian pounds (\$2,225,000).

Edgar F. Kaiser, president of Kaiser Industries Corp. and Willys Motors, Inc., said that initial production will use approximately 25 to 30 per cent Australian parts content. The percentage will be increased progressively over the next two and one-half years, following the plan approved by the Commonwealth Government.

Packard Prices for 1958 Line Remain at Last Year's Level

Prices on the 1958 Packard sedan and station wagon have remained at the 1957 level, although power brakes are listed as standard equipment. Last year, customers paid \$37.66 extra for the optional power brakes.

The four-door sedan price is \$3212, including Federal tax and suggested dealer delivery and handling charges. The four-door station wagon is \$3384. Prices of the two-door hardtop and Hawk, both new to the line this year, are \$3262 and \$3995 respectively.



OFFERS



Spin-Finish

Replaces hand and automatic buffing!

- ☒ One-operation finishing of most complex parts
- ☒ Completely dry process... no lubricants
- ☒ Dust and fume free... no exhaust systems
- ☒ No set-up time required

Wipe the slate clean of all present concepts of speed, efficiency and costs in pre-plating finishing of brass, zinc-base and aluminum die-cast parts! In one short, automatically-timed operation—and on a *multiple mounting* of parts—new SPIN-FINISH produces surfaces and lustre equal to or surpassing that of buffing. Write for information.

GRAY-I-FLO CORPORATION

Dept. AI-2 400 Norwood Avenue, Sturgis, Michigan

for extreme
temperatures



SILICONE

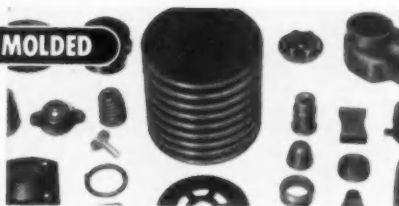


**RUBBER PARTS
AND
COMPONENTS
BY**

Goshen Rubber

Goshen-developed silicone rubber compounds offer properties like resistance to temperature extremes -80 to $+500^{\circ}\text{F}$; resiliency over a range of -120°F to $+600^{\circ}\text{F}$; low compression set; resistance to chemicals, oxidation, ozone, moisture, corrosion, shock, abrasion; freedom from stain, odor, tackiness and toxicity; same shrinkage as organic rubber, with resultant advantages.

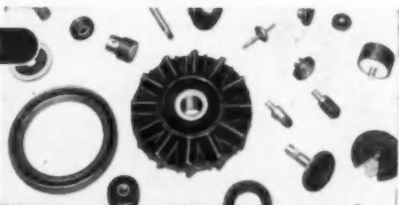
CUSTOM MOLDED



LATHE CUT



BONDED



GORSIL compounds are now available for adaptation to your next part problem that involves temperature.

Goshen Rubber Co., INC.

2728 S. TENTH STREET

GOSHEN, INDIANA

Assembling Lincolns and Continentals

(Continued from page 49)

The first major step is the attachment of front suspension mountings, then the front brake assembly, and installation of rear shock absorbers. A little later the body reached the station at which the front coil springs are compressed in a special fixture and installed in the mounting. The dual exhaust components then are installed, leaving the front connections loose for later attachment.

Beyond this point the monorail makes a 180 deg. turn to reach the point where there is a short table-height conveyor on which are built up the rear suspension and rear axle assembly. This entire assembly then is mounted on a special pneumatic lift which is wheeled under the body. It is employed to lift the assembly into place, at the same time compressing the rear coil springs to standard height.

Following this, the gas tank is installed and the conveyor dips to bring the body to floor level so as to facilitate attachment of rear bumpers. At this point the monorail rises above floor level to clear a main aisle, and turns 90 deg. to approach the main assembly line.

The conveyor then dips down to floor level, moving over a pit so as to permit workers to handle operations both above and below the floor. The next major step is the engine installation. Engines approach this station on a monorail from the dress-up line and are moved to the line on a hoist. As illustrated, the entire powerplant assembly is held in a balanced carrier and is inched into place in the compartment by means of a control panel operated by the hoist operator. The powerplant assembly is tilted and moved into place smoothly, despite the cramped quarters. As the engine moved into place, operators on the floor as well as in the pit completed the attachment.

As the bodies move along the line from this point they go through a booth erected over the line and are undercoated. Upon emerging from the booth, they reach the station at which wheel and tire assemblies are attached. The fastenings are made up quickly by means of five-spindle nut runners.

With the mounting of wheels and tires, the assembly has become an automobile capable of rolling on its wheels. At this point the wheels make contact with the flat top conveyor while the carrier arms, that have transported the entire assembly up to this point, automatically release and move away on the overhead conveyor to return to the start of the cycle.

Farther along the line hoods are fed in on an overhead conveyor line and are installed on the car. This is followed by attachment of front bumpers, installation of front seats, and attachment of the air cleaner. Beyond this point the cars are given their final touches, engines are running, and cars are ready to roll off the final line.

Tru-Stop Brakes

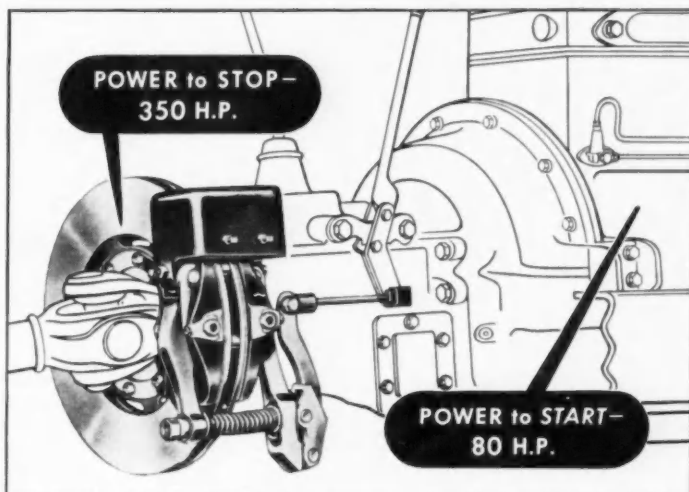
Meet Every Heavy-Duty Safety Requirement

**OFFER POSITIVE PROTECTION
AGAINST RUNAWAY OR PARKING
ACCIDENTS—AT LOWEST COST**

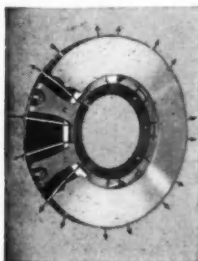
HERE IS WHY:

**They have surplus power
required for emergency
service—no dangerous
self-energizing**

TRU-STOP Heavy-Duty Emergency Brakes are not only excellent parking brakes. They serve as a complete, independent and fully reliable braking system. Operating on the propeller shaft they enable the driver to continue on safely in the event of service brake failure. TRU-STOP brakes have the surplus braking capacity to be used repeatedly as an auxiliary to service brakes.

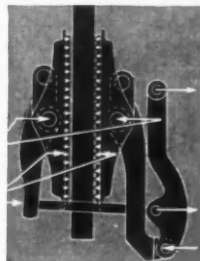


Brakes actually do more work than the engine in terms of horsepower. Where it takes 80 HP to accelerate to 20 miles per hour, it takes 350 HP to make a safe stop from 20 miles per hour within required limits.



Ventilated to throw off heat

Brake efficiency depends on ability to throw off intense heat—rapidly. Discs of TRU-STOP brakes are exposed to the air even during the braking operation. Ventilated design circulates air between the disc plates.



Give uniform brake pressure

Disc of TRU-STOP brakes is "squeezed" between the flat surface of the shoes. Effort applied to brake lever operates front and rear lever arms simultaneously. Pressure is exerted on the center of each shoe. Entire lining surface is in contact.

FOR SAFE, ECONOMICAL, HEAVY-DUTY BRAKING WITH MAXIMUM LIFE AND MINIMUM MAINTENANCE

TRU-STOP Brakes are used on a great variety of mobile and stationary equipment

SUCH AS—

Motor cranes

Road rollers

Dump trucks

Power dividers

Cooling tower fans

Oil well pumps

Cold header presses

Scrubbing machines

Wire rope stranders

Fork lift trucks

Motor scrapers

Tractors

Graders

Diamond core drills

Electric locomotives

Oil well servicing

rigs

Railway inspection

cars

Shapers

Power take-offs

Winches

Motor shovels

Tractor loaders

Conveyors

Hard rock drill

positioners

Mine locomotives

Power presses

Railway power

ballisters

Cable tool spudders

Aerial tram cars

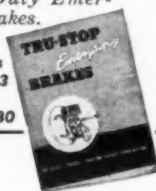
Tension wire

stringers

We will be glad to answer any questions or give you more detailed information about TRU-STOP Heavy Duty Emergency Brakes.

Send for

Catalogs
DH-33
and
DH-530



Automotive and Aircraft Division AMERICAN CHAIN & CABLE

601 Stephenson Building, Detroit 2
2216 S. Garfield Street, Los Angeles 22 • Bridgeport 2, Conn.





MARKING METAL?

Blaisdell Markers write on anything.

CHINA MARKER

Bold, bright marking for all slick surfaces—14 vivid colors.



GET THESE BLAISDELL EXCLUSIVES

SPEE-D-POINT perforation for easy sharpening—STED-D-POINT staple for secure lead

DU-ALL MECHANICAL PENCIL

Marks all surfaces. Six colors with matching leads.

Write for sample naming this publication. Our many special pencils have solved varied marking problems since 1893. Let us help you.

TRADE MARK REG. U.S. PAT. OFF.

BLAISDELL PENCIL COMPANY
BETHAYRES, PENNA.

Brazil Gives Electro-Motive \$15 Million Diesel Order

The Brazilian government has placed an order with GM's Electro-Motive Div. for 100 Diesel locomotives, valued at \$15 million.

The division said shipments will begin in May and will be completed in September. The Brazilian order bolsters Electro-Motive's 1958 order position, which still is expected to fall below the 1957 level.



More than 65 per cent of the \$450 million spent by refiners in 1956 went to improve the quality of gasolines, and other petroleum products.

Most of the output of oil wells being completed now will be used to meet increasing future consumption rather than current demand.

Almost all of the nation's crude oil is found in rock formations that are more than 400 centuries old.

Every second of the day more than 1772 gallons of gasoline were burned last year by the nation's automobiles, trucks, planes, boats, and other gasoline-powered units.

A DuPont survey has revealed that if titanium sponge can be sold at \$1.25 a pound (present price: \$2.25), the potential market might be of the same magnitude as that of stainless steel—a million tons a year.

American plants produce 89 per cent of the total world supply of synthetic rubber.

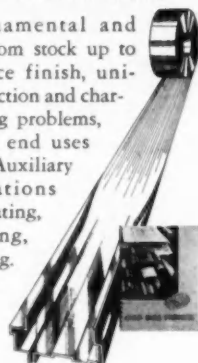
The U. S. now has about 4,000 to 5,000 miles of four-lane highways.

American airliner manufacturers have produced more than 2000 commercial transports for U. S. and world airlines since the end of World War II.

FREE YODER BOOKS OFFER "KNOW-HOW" on • ROLL FORMING • TUBE MAKING • SLITTING

COLD-ROLL FORMING

Structural, ornamental and tubular shapes from stock up to 1/2" thick. Surface finish, uniformity, stock selection and characteristics, plating problems, production costs, end uses and applications. Auxiliary automatic operations including perforating, notching, welding, coiling, embossing. 88 pages, fully charted and illustrated.



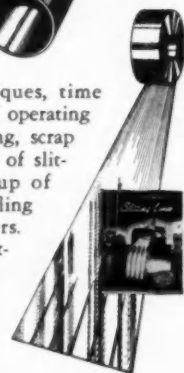
PIPE AND TUBE MAKING

Ferrous or non-ferrous, electric weld, resistance and induction or gas types. Small or large diameter. Tooling, welding, stock ranges personnel training, quality and tolerance control, speeds, power consumption, annual production rating charts. 64 pages, fully illustrated.



SLITTING

Operating techniques, time studies, analyses of operating cycles, coil handling, scrap disposal, selection of slitters and setting up of slitting lines, including coilers and recoilers. Advantages of slitting and how to compute "profit-point". 76 pages, fully illustrated. Any or all of these books are free upon requests. Send for your copies today . . . Ask for them by title.



THE YODER COMPANY
5553 Walworth Ave. • Cleveland 2, Ohio



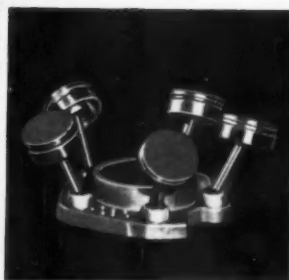
How
DENISON
MULTIPRESS
 speeds
MASS
ASSEMBLIES

Turns out 400
 precision piston rod
 assemblies a day with
DENISON MULTIPRESS

EACH air-conditioning system produced by this leading manufacturer for passenger car use requires a compact 5-cylinder compressor assembly whose piston rods are actuated by a wobble plate.

To complete this assembly, a ground ball at the end of each rod is locked into a socket joint in the plate. With a single swift ram stroke, the Multipress forms the socket over the ball. Each socket joint is held to uniform tolerances . . . to be tight, but not bind. Scrap is nil.

Whatever your job—a Denison hydraulic specialist can show you how to speed your production and cut costs. Write us, Denison Engineering Division, American Brake Shoe Co., 1212 Dublin Road, Columbus 16, Ohio.



400 COMPLETE ASSEMBLIES A DAY
 with Denison 8-ton hydraulic Multipress. Each assembly requires 5 separate forming operations—locking 5 piston rods to wobble plate.

Denison, Denison HydrOilics, and Multipress are registered trademarks of Denison Eng. Div., ASCO

DENISON
HydrOilics

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, etc. This list is for the period Dec. 31 to Jan. 30, inclusive.

AERODEX, INC., Miami, Fla.

Overhaul of R-2800-52W/97/99W/103W aircraft engines—646 ea.; reclamation of R-2800-73 aircraft engines and component rework—97 ea.—\$1,069,159

AMERICAN MOTORS CORP., Detroit, Mich.

Automobile, sedan, light, 5 pass.—25 ea.—\$32,961

ARMSTRONG RUBBER CO., West Haven, Conn.

Tire, 10.00 x 20, 12 PR—1777 ea.—\$84,016
Tires and tubes—indef. qty. 1/1/58 thru 12/31/58

BENDIX AVIATION CORP., North Hollywood, Calif.

Parts applicable to C124A aircraft, B47 aircraft, C97 aircraft—\$97,244

CARLISLE DUNLOP TIRE AND RUBBER CORP., Buffalo, N. Y.

Tires and tubes, pneumatic, aircraft—1/1/58 thru 12/31/58—indefinite qty.

CATERPILLAR TRACTOR CO., Peoria, Ill.

Repair parts (Engines, gasoline & Diesel)—8 ea.—\$46,096

CHRYSLER CORP., Detroit, Mich.

Modification of the M1 Cupola on the M48A1 and M48A2 tanks—\$190,500

CHRYSLER MOTORS CORP., Washington, D. C.

Trucks—6 ea.—\$16,072

COOPER TIRE & RUBBER CO., Findlay, Ohio

Tire, 7.50 x 20, 8 PR—18,389 ea.—\$383,410

Tire, 7.00 x 16, 6 PR—29,569 ea.—\$441,465

Tire, 6.00 x 16, 6 PR—6615 ea.—\$71,772

CURTISS-WRIGHT CORP., Caldwell, N. J.

Blade assemblies for C-133 aircraft—\$1,500,000

CURTISS-WRIGHT CORP., Wood Ridge, N. J.

Overhaul of Gov't-owned aircraft engines used on H-21C Army aircraft—95 ea.—\$357,561

Overhaul of Gov't-owned aircraft engines used on H-34A Army aircraft—157 ea.—\$664,071

DOUGLAS AIRCRAFT CO., INC., Santa Monica, Calif.

Repair parts for Nike system—\$65,987

Repair parts for Nike system (1) \$59,160; (2) \$48,000; (3) \$29,590

FAIRBANKS, MORSE AND CO., Fair Lawn, N. J.

Repair parts for Diesel engines, various—14,452 ea.—\$69,980

FORD MOTOR CO., Washington, D. C.

Trucks—38 ea.—\$65,948

GENERAL MOTORS CORP., Wayne, Mich.

Repair parts for Diesel engines, various—165 ea.—\$28,078

GENERAL MOTORS CORP., Chevrolet Motor Div., Detroit, Mich.

Trucks—121 ea.—\$203,114

GENERAL MOTORS CORP., Foreign Dist. Div., New York, N. Y.

Trucks—9 ea.—\$17,640

THE GOODYEAR TIRE & RUBBER CO., INC., Akron, Ohio

Tires and tubes, pneumatic, aircraft—indefinite quantity—1/1/58 thru 12/31/58

Aircraft fuel cells applicable to the F/RF84F aircraft—14 items—\$979,719

GRAND CENTRAL AIRCRAFT CO., Fresno, Calif.

IRAN and modification of T-33a type aircraft—\$800,000

GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, N. Y.

S2F1 cockpit enclosures and spare parts—lot—\$174,938

LOCKHEED AIRCRAFT CORP., Marietta, Georgia

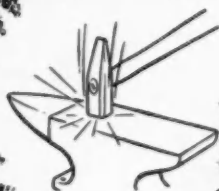
C-130B airplanes, data, bill of materials, static test components—\$22,000,000

MANSFIELD TIRE & RUBBER CO., Mansfield, Ohio

Tire, 14.00 x 20, 12 PR—1530 ea.; tire, 14.00 x 20, 20 PR—140 ea.—\$163,772

WAUSAU

Alloy No. 2



Valve Seat Inserts that stay tight in aluminum



Developed especially for aluminum alloy engines Wausau Alloy No. 2 Valve Seat Inserts have the same expansion characteristics as many popular aluminum alloys. Result: a tight seat that won't work loose. These inserts have high impact resistance which is work-hardened in use. They are corrosion resistant and extremely stable under heat, resisting burning and distortion under severest operating conditions. Alloy No. 2 inserts are available in a wide range of types and sizes to fit your specifications. Call or write Wausau Motor Parts Company, 2300 Eau Claire Street, Schofield, Wisconsin.



MCDONNELL AIRCRAFT CORP., St. Louis, Mo.

RF-101A/C aircraft Retrofit kits—\$1,000,000

NORTH AMERICAN AVIATION, INC., Los Angeles, Calif.

Modification of C-131B aircraft to photographic test bed configuration—\$251,292

NORTHROP AIRCRAFT, INC., Hawthorne, Calif.

Airframe development program T-38—\$6,000,000

NORTHWESTER MOTOR CO., Eau Claire, Wis.

Tractor, warehouse, gasoline powered. Type II, 4000 lbs drawbar pull capacity—16 ea.—\$45,314

PACIFIC TIRE & RUBBER CO., Oakland, Calif.

Tire, 7.50 x 20, 8 PR—\$737 ea.; tire, 7.50 x 20, 8 PR—17,901 ea.—\$524,543
Tire, 9.00 x 16, 8 PR—\$451,689

RAYTHEON MANUFACTURING CO., West Newton, Mass.

Procurement of HAWK missiles & components—\$13,249,594

RYAN AERONAUTICAL CO., San Diego, Calif.

Overhaul of B-50 and C-97 exhaust components—Job—\$720,242

SOUTHERN CALIF. AIRCRAFT CORP., Ontario, Calif.

REAN and modification of F-86H type aircraft—38 ea.—\$300,000

SOUTHWEST AIRMOTIVE CO., Dallas, Texas

Overhaul of components for J33 aircraft engines—\$39,425

WESTERN ELECTRIC CO., INC., New York, N. Y.

Nike spare parts and components—\$154,487

Ford, Chevrolet Pay Employees \$1.4 Million for Suggestions

Ford Motor Company and Chevrolet Div. of General Motors paid employees more than \$1.4 million for improvement suggestions during 1957.

Ford paid out \$887,062 to more than 13,000 award-winning employees under the suggestion plan. During the year, 64,077 suggestions were submitted. In the 10 years since the start of the program, Ford has awarded \$5,562,030.

Chevrolet paid out \$571,846 to more than 9700 employees during 1957. The division received nearly 19,000 suggestions from employees of 30 manufacturing and assembly plants.

Gar Wood Blames High Costs For Decline in Net Income

Gar Wood Industries, Inc. cited rising costs as responsible for a decline in net earnings in fiscal 1957. The company's 1957 income was \$513,623, compared with \$1,006,122 a year ago.

Net sales, however, rose to \$43,402,989 from the previous year's \$41,041,576. Increases in deliveries under defense contracts offset the decline in sales of construction and truck equipment.

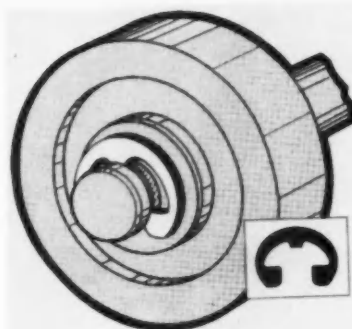
NEW PRODUCTS

(Continued from page 93)

been narrowed and the inside of the lugs made parallel at the gap.

The fastener is made in sizes to accommodate shafts ranging in diameter from 3/32 to 7/16 in. Standard material is carbon spring steel (SAE 1065-1090); standard finish is oil-dipped. **Waldes Kohinoor, Inc.**

Circle 19 on postcard for more data



WAUSAU

WF-3-0



Sintered Metal Piston Rings



WF-3-0 is a uniquely different sintered iron alloyed in the powder form so as to permit extremely accurate analysis control when the metal is produced. As a result, rings made from WF-3-0 have greater uniformity and stability, higher tensile strength and high modulus of elasticity. Ring breakage is eliminated, ring life increased and performance greatly improved. In addition, simplified production techniques have resulted in a better ring at lower cost. WF-3-0 rings are especially effective in small bore engines, automatic transmissions, power steering units and similar applications. Call or write **Wausau Motor Parts Company**, 2300 Eau Claire St., Schofield, Wis.



Here's the kind of service you get . . .

with **HONEYWELL** instrumentation



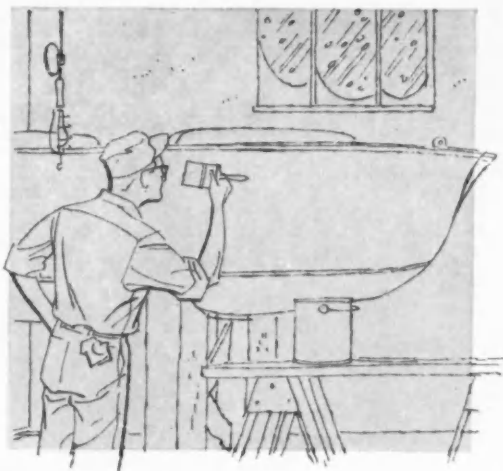
Bill Lewis, typical service engineer, proves how you can depend on Honeywell for fast, on-the-spot service even in emergencies.



3 It took Bill two hours to drive to the plant through the storm. He spotted the trouble immediately; a thermocouple and its protecting tube had burned out. It might have meant four to five thousand dollars' worth of damage.

Honeywell service begins when you first decide you need instruments, and continues long after they're installed. It includes:

- Preliminary engineering, even before specifications are written.
- Application engineering for installation and startup.
- Service engineering help from your nearby Honeywell branch.
- Periodic service and swift help in emergencies.
- Training of your operators at the Honeywell Instrumentation Education Center.



1 Bill Lewis, service engineer at Honeywell's Fort Wayne branch, was in his garage, touching up the paint on his 13-foot outboard. The bowling match had been called off that night because of the snowstorm, and Bill was glad to be home.



2 At 9:30 a call came from the Crosby Laughlin Division of American Hoist and Derrick Company in Fort Wayne. A controller on a galvanizing kettle wasn't working and unless it was fixed fast, the pot would either freeze or burn out. Bill said he would be out right away.



4 Bill didn't have a thermocouple with him that would fit, so he improvised a temporary couple and protecting tube and got the system going. Early the next morning he called the Honeywell branch in Indianapolis and had the correct thermocouple and tube shipped quickly to the plant. Next day, he carefully checked out the entire installation.



5 Now, Crosby Laughlin Division is signed up with the Honeywell Periodic Service Plan, and its complete instrumentation is checked and serviced every month. Any spare parts needed are now available at Honeywell's Fort Wayne branch. Bill hasn't had to make another emergency call to the plant since.

Around-the-clock help in emergencies is but one of many Honeywell services that give you extra value for your investment in instruments. Get the complete service story from your nearby Honeywell field engineer. He's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO.,
Industrial Products Group . . . Brown Instruments,
Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell



First in Controls

For the most reliable vehicle air brake systems—

Wagner ROTARY AIR COMPRESSORS



provide ample
air...require less
maintenance

It is sound judgement to equip the air brake systems of heavy duty vehicles with Wagner Rotary Air Compressors, because Wagner Compressors have the following special features:

HIGH VOLUMETRIC EFFICIENCY Rotary compression forces all air from the compression chambers. Pressure recovery is rapid at all compressor speeds.

LOW TEMPERATURE AIR DELIVERY Oil separation and cooling before air is discharged reduces temperatures and prevents carbon formation. Fire hazard is reduced. Flexible connection may be used in discharge line.

UNIFORM TORQUE LOAD Thousands of small overlapping air compression impulses per minute maintain a more uniform load with moderated stresses and assure smooth, quiet operation with long belt life.

LOW FRICTION LOSS All rotating parts are turned by the rotor shaft, suspended on two bearing surfaces.

HIGH R.P.M. Compressor can be operated at high R.P.M. High reduction drives are unnecessary.

The Wagner Rotary Air Compressor pumps compressed air into the air reservoir, providing the pressure required for the operation of brakes and other air powered devices. The compressor runs continuously while the engine is operating. Pumping is regulated by a control valve which starts or stops air compression by "loading" or "unloading" the compressor proper. This action establishes an intermittent pumping cycle which keeps reservoir pressure within the desired range.

You have a choice. These rotary compressors are available in either 9 C.F.M. capacity, air or water-cooled, or 12 C.F.M. capacity, water-cooled, and are standard with every Wagner Air Brake System.

For details on these compressors, Wagner Air Brake Systems and Equipment for trucks, tractors, trailers, buses and off-the-road equipment ... request a copy of Catalog KU201B.

Fleet operators know and trust Wagner

Wagner Electric Corporation

6363 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U.S.A.
(Branches in principal cities in U.S. and in Canada)

ask for Catalog KU201B



WK58-2A

R/M TEFLON* hose withstands heat, pressure and vibration in air brake systems

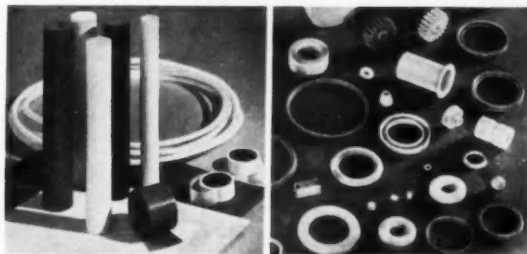
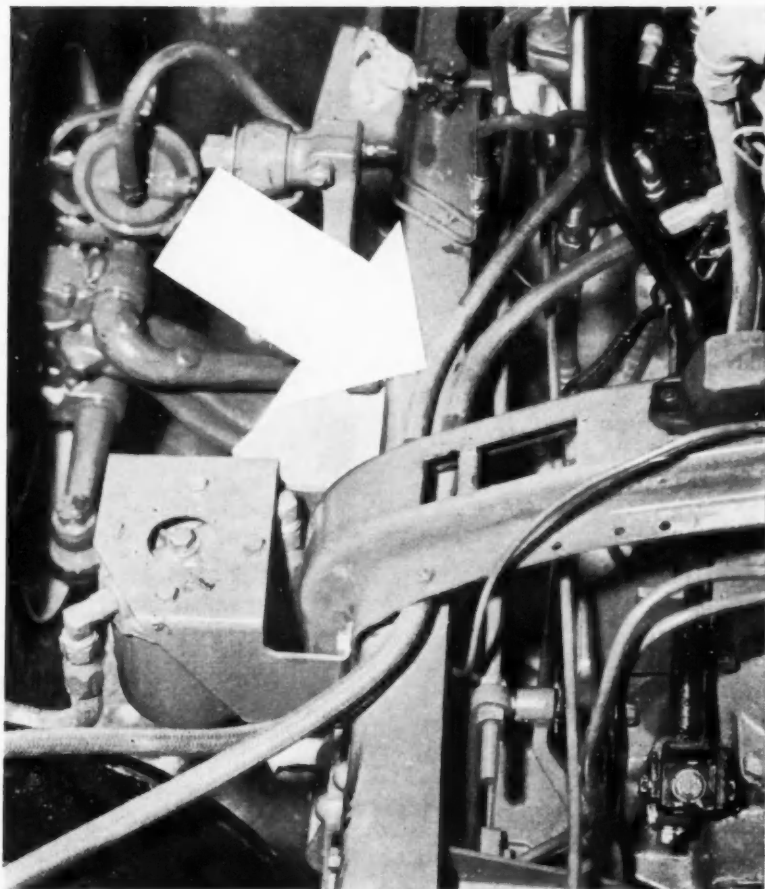
When the air brake compressor is mounted on a truck engine, the line must be guarded against breakage from vibration by a flexible coupling between the compressor and the copper tubing which carries the air to the brake system. Raybestos-Manhattan Wire-Braid Covered "Teflon" Hose is ideal in such a case . . . is specified by leading truck manufacturers because of its unique chemical, electrical and physical characteristics.



"Teflon" is chemically inert . . . immune to corrosion by the new fuels, lubricating oils, and hydraulic fluids. It is flexible and does not expand, contract or fatigue. Low coefficient of friction minimizes pressure drop in fluid systems. It functions in continuous service at temperatures from -100° to $+400^{\circ}\text{F}$.

R/M has pioneered in exploring many new uses for "Teflon" in automotive and aircraft construction. Our research and testing laboratories and complete manufacturing facilities are yours to command in developing and producing specialized "Teflon" elements for your products.

*A DuPont trademark



Other R/M "Teflon" products of interest to your industry include rods, sheets, tubes and tape; centerless ground rods held to very close tolerances; stress-relieved molded rods and tubes; parts painstakingly machined to your specifications. Our mechanical grade of "Teflon"—Raylon—has many virgin "Teflon" characteristics.



RAYBESTOS - MANHATTAN, INC.

PLASTIC PRODUCTS DIVISION FACTORIES: MANHEIM, PA.; PARAMOUNT, CALIF.

Contact your nearest R/M district office listed below for more information or write to Plastic Products Division, Raybestos-Manhattan, Inc., Manheim, Pa.
BIRMINGHAM 1 • CHICAGO 31 • CLEVELAND 16 • DALLAS 26 • DENVER 16 • DETROIT 2 • HOUSTON 1 • LOS ANGELES 58 • MINNEAPOLIS 16
NEW ORLEANS 17 • PASSAIC • PHILADELPHIA 3 • PITTSBURGH 22 • SAN FRANCISCO 5 • SEATTLE 4 • PETERBOROUGH, ONTARIO, CANADA

RAYBESTOS-MANHATTAN, INC., Engineered Plastics • Asbestos Textiles • Mechanical Packings • Industrial Rubber • Sintered Metal Products • Rubber Covered Equipment
Abrasive and Diamond Wheels • Brake Linings • Brake Blocks • Clutch Facings • Laundry Pads and Covers • Industrial Adhesives • Bowling Balls

Resistance Welding Tank Cooling Fins

SCI AKY

HELPS PUT PROFIT
INTO MANUFACTURING

Sciaky Techniques Permit Adaptation of Standard Equipment to Automated Production

Automated seam welding is another Sciaky Resistance Welding Technique that can improve profit potential. And, the adaptation of *standard* equipment means that now profits increase faster because no huge expenditures are required for constructing "special" welders.

For example, the largest independent manufacturer of transformers in the world, Moloney Electric Co., St. Louis, Mo., automated the seam welding operations for their distribution transformer tanks by merely adding an automatic positioning fixture to a *standard* Sciaky Patented Three-Phase Resistance Welder.

Welding cooling fins to the tanks was originally a slow, costly are welding job, and only one "L" shaped fin could be fastened at a time. Production requirements increased and fusion welding costs became prohibitive. As a result two standard Sciaky Longitudinal Seam Welders were installed to weld fins in "U" shaped pairs. Thus, Sciaky Resistance Welding Techniques increased production, and also improved tank design. Manual positioning of tanks and fins was adequate to meet production requirements at that time.



FIG. 2 After first weld cycle begins, electrode wheels progress down first fin as tank automatically indexes into throat of the welder. The tank then indexes radially for insertion of second fin, which is welded in position on return stroke of the tank back out of throat of welder.

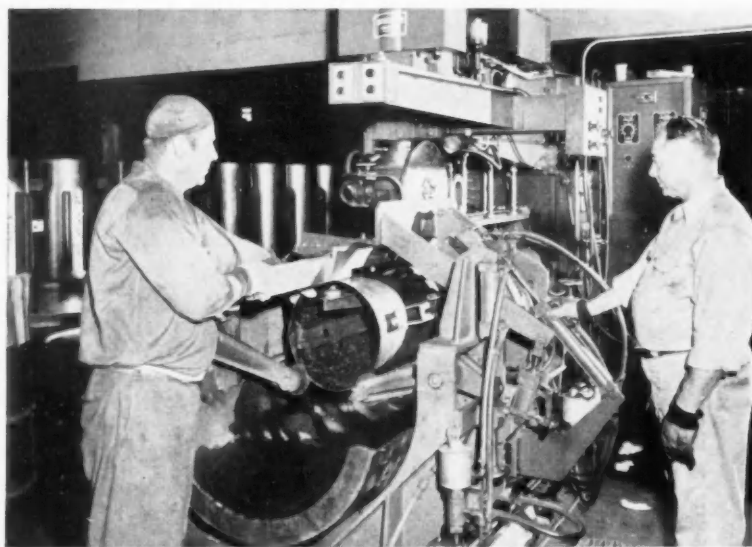


FIG. 1 After tank is loaded in automatic fixture, operator inserts first pair of "U" shaped fins in welding position. (Two brackets mounted on side of tank were joined in previous projection welding operations.)

Then, because of constantly rising materials and labor costs, Moloney faced the same "sliding profits" problem that confronts every manufacturer today. A research program was initiated to determine how to cut costs and improve manufacturing methods. This led them to study simple *automation* of the cooling fin and tank assembly operations.

Automatic Positioning Fixture

Sciaky engineers helped solve the problem with the new Sciaky Longitudinal Seam Welder equipped with special automatic fixturing. This automatic positioning fixture provides continuous, fool-proof seam welding of the cooling fins. A simple adjustment permits immediate change-over for various tank sizes, as well as radial spacing of fins.

This is how the *standard* Sciaky welder with automatic positioning fixture cuts manufacturing costs and increases production—all three operations are performed in one cycle . . .

- (1) The machine welds one pair of cooling fins to the tank as it

indexes into throat of welder.

- (2) Positioner then indexes tank radially for the next seam welding operation.
- (3) On return stroke, the machine seam welds the second fin.

Results

The Sciaky Patented Three-Phase Resistance Welder with automatic positioning fixture and two operators **DOUBLED** production over the previous method when two welders and four operators were required. The two previous machines and the extra two men were absorbed into other resistance welding operations.

Information Available

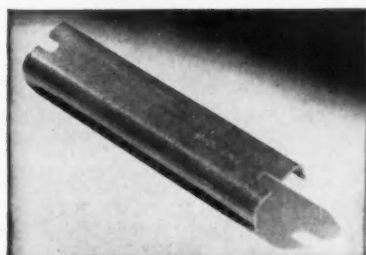
Case histories outlining the successful use of Sciaky Resistance Welding Techniques are available on request. Specific recommendations will be furnished on receipt of an outline of your requirements.

Write today, mentioning the information you would like to receive. No obligation. Sciaky Bros., Inc., 4925 W. 67th St., Chicago 38, Illinois. PORTsmouth 7-5600.

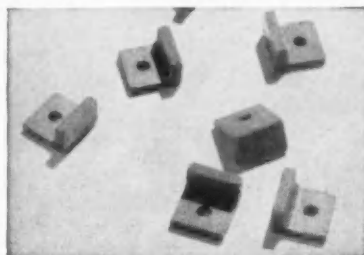


C-D-F MACHINES TO CLOSE TOLERANCES.

Great accuracy is required to furnish ball bearing race retainers made from fine weave cotton fabric Dilecto rolled laminated plastic tubing. When plastics can do a better job than other materials, come to C-D-F for technical and production help.



C-D-F PIONEERED IN POST-FORMING of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-forming.

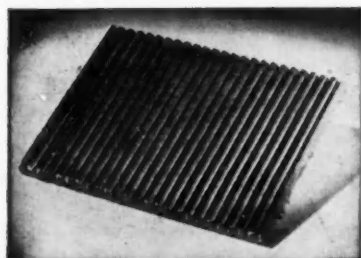


C-D-F DOES THE UNUSUAL. These rubbing blocks are made from fine-weave cotton cloth Dilecto molded tubing that has been pierced and cut. The part gains in mechanical strength — the product gets longer service life.



C-D-F SPECIALIZES IN AUTOMATIC SCREW MACHINING of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

Yes, C-D-F is a big reliable source for fabricated plastics!



C-D-F SERVES MANY INDUSTRIES with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.



C-D-F IS A PUNCHING SPECIALIST on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.



C-D-F COMES UP WITH THE ANSWERS to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.

See our general catalog in Sweet's Design File for more technical data, the address and telephone number of your nearest C-D-F sales engineer. Also, write for detailed information, samples, or send us your print for quotation.



CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE *Bush* COMPANY • NEWARK 2, DEL.



BEFORE BRUSHING

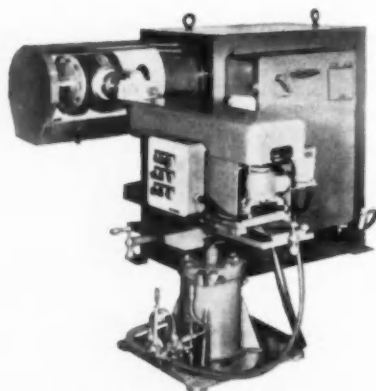
Port plate for hydraulic pump has loose burrs and sharp edges. Cost to remove these by hand: 14¢



AFTER BRUSHING

All burrs are thoroughly removed and surface junctures blended to close uniformity. Cost with Brushamatic: 1.3¢

Quality when the pressure's on
... but costs 91% less when finished with
OSBORN Brushamatic® Methods



OSBORN BRUSHAMATIC® 3-A
operates on preset time cycles.

These port plates for hydraulic pumps are quality finished to precision tolerances to provide positive seal against high internal fluid pressures. For peak dependability in severe hydraulic service, surface junctures are uniformly blended in one simple, automatic operation with Osborn's Brushamatic Machine. At the same time, all burrs are thoroughly removed to eliminate subsequent fouling of hydraulic controls.

Production rate . . . both sides finished, 180 pieces per hour with Osborn Matic® Brushes.

Low cost, precision finishing like this may be applied to many types of products you now build. An **Osborn Brushing Analysis**, made in your plant at no obligation, can show you how to speed production . . . cut costs . . . improve product quality. Write us for details—and for your copy of the 20-page Brushamatic booklet. *The Osborn Manufacturing Company, Dept. E-61, Cleveland 14, Ohio.*

Osborn Brushes 

BRUSHING MACHINES • BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • FOUNDRY PRODUCTION MACHINERY



"Water-sealed" by Polyken

**Complete line of Polyken Waterproof
Tapes seal out water (and dust...
and airborne contamination)**

If you make a product that might suffer from exposure, take note:

The reason, of course, is that *Polyken* tapes can provide watertight, dustproof seals against the elements. Each tape is constructed to meet rigid government and industrial requirements for moisture barrier sealing.

Since these tapes come backed with vinyl or polyethylene film—or cloth coated with pyroxylin, vinyl or polyethylene—they fit into every packaging scheme.

Money-saving features

Polyken tapes do other jobs, too. Reinforce... protect... mend... insulate.

You'll like their ease of application (*right from the roll*), saving many man-hours of labor.

Send the coupon for complete information, or tell us your particular packaging problem.

Polyken®

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

MAIL THIS COUPON NOW!

Polyken, Dept. 2

309 West Jackson Blvd., Chicago 6, Illinois

Please send me your latest literature and data file on the complete line of Polyken Waterproof Tapes.

Name _____ Title _____

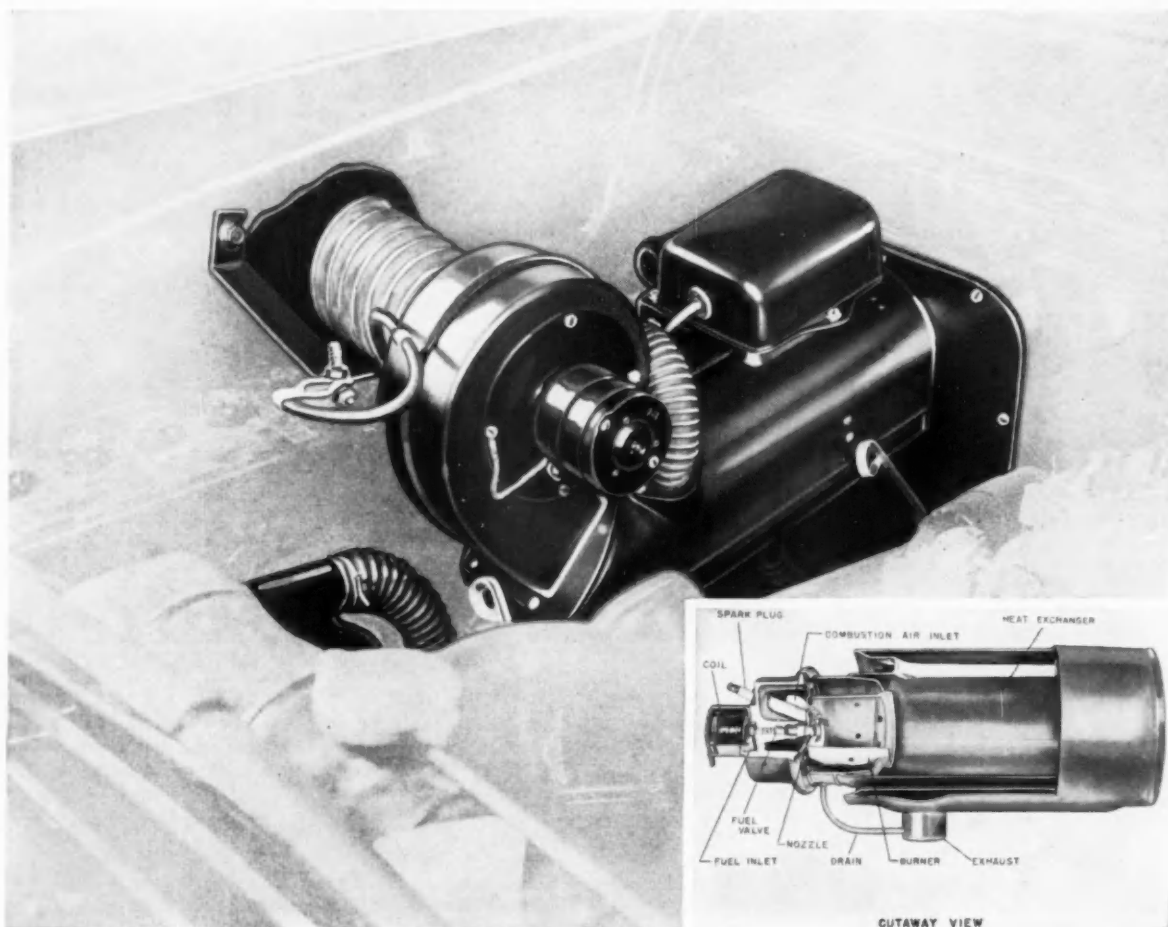
Company _____

Street Address _____

City _____ Zone _____ State _____

Problem-Solving Products from Republic

RESIST HEAT AND CORROSION, INCREASE STRENGTH/WEIGHT RATIOS



CORROSION AND HEAT PROBLEMS were solved in this car heater with the help of Republic ENDURO® Stainless Steel. The gasoline burning heater is manufactured by South Wind Division of Stewart-Warner Corporation, Indianapolis, Indiana.

The unit is equipped with its own spark plug and fuel pump which ties into the car's gas line just ahead of the regular fuel pump. The spark plug ignites the gasoline which burns with a continuous flame for regulated periods of time. Thermostatically controlled and rated at 30,000 BTU's, the heater will deliver warm air in five seconds and 180° temperatures in 30 seconds.

ENDURO Stainless Steel, Type 430, was selected for the combustion chamber and surrounding housing

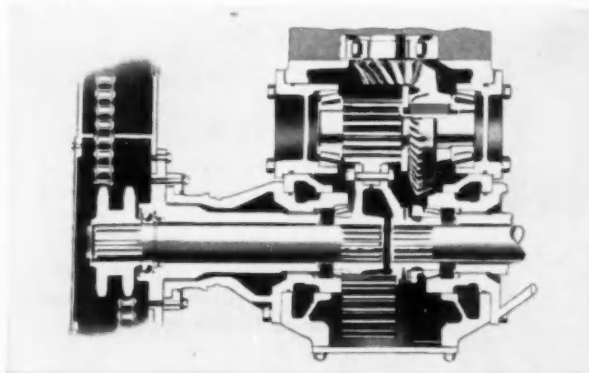
because of its low thermal expansion and resistance to corrosion and oxidation at high temperatures (up to 1400°F).

Still another advantage of ENDURO, Type 430, is that it can be readily formed into desired shapes by rolling, bending, pressing, drawing, etc. Its properly prepared surface shows good resistance to atmospheric attack and tarnishing which accounts for its widespread use as molding and decorative trim sections.

Type 430 is but one of more than 35 standard types of stainless steel produced by Republic. Our metallurgists and engineers are always available to work with you in selection, application and processing. Just mail the coupon. There is no obligation.



FOR MAXIMUM SUPPORT, National Seating Company uses Republic ELECTRUNITE® Mechanical Tubing in their "cradle recline" passenger seats. The seat is mounted on 1" O.D. square ELECTRUNITE, bent to a 45° angle for styling. High ductility and superior strength-to-weight ratio of ELECTRUNITE make this operation possible. Rear legs are of 1/2" x 14-gage round tubing. Besides structural and ornamental advantages, steel tubing eliminates the danger of accidents caused by sharp-edged structural members. Send coupon for complete details on ELECTRUNITE.



OUTSTANDING CORROSION-RESISTANCE even after deep-drawing is provided by Republic Continuous Galvanized Steel.

Under the toughest manufacturing conditions the zinc coating will not crack, flake or peel in any forming operation permitted by the base metal. That's why Mackenzie Muffler Company, Inc. uses it in fabricating mufflers for cars, trucks and tractors. Republic Continuous Galvanized cuts manufacturing costs, too. It eliminates costly hot dip operations. Permits continuous uninterrupted production. Available in a wide range of sizes, gages and grades in sheets or coils. Mail the coupon for complete facts.

EXCEPTIONALLY HIGH STRENGTH-TO-WEIGHT RATIOS plus resistance to fatigue, stress, shock and impact are values of Republic Alloy Steels that equipment builders have been relying on for years. Engineers and metallurgists of the Adams Division, LeTourneau-Westinghouse Company, for example, spent thousands of hours on research and testing of all types of steels to find one that would reduce ultimate fatigue to an absolute minimum in the drive axle of their "660" Motor Grader. They selected Republic Hot Rolled 4340 Alloy Steel. This fine steel not only resists fatigue, but also is able to take high torque without a permanent set. Specify Republic Alloy Steels where strength and toughness must resist heavy-duty roughness. Our metallurgists will help you.

REPUBLIC STEEL



*World's Widest Range
of Standard Steels and
Steel Products*

REPUBLIC STEEL CORPORATION

DEPT. C-5124

3106 EAST 45TH STREET • CLEVELAND 27, OHIO

Have a metallurgist call: ☐ Stainless ☐ Alloy

Send more information on:

☐ ENDURO Stainless Steel

☐ ELECTRUNITE Mechanical Tubing

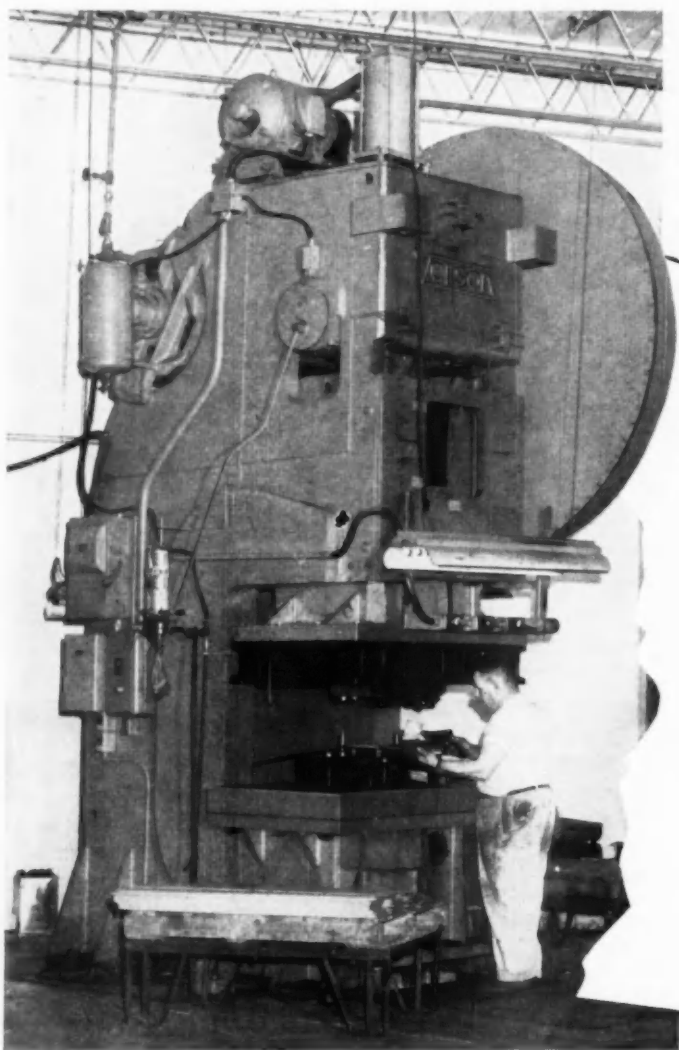
☐ Continuous Galvanized Steel ☐ Alloy Steels

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



**A Verson
Press user
reports on
versatility:**

*"...it would be an almost
impossible task to list
all of the usages
to which our
**Verson
Gap Press**
is being subjected"*

W. D. Tucker
General Manager
John Blue Company, Inc.

We at Verson often talk of the versatility of our presses and the advantages they offer anyone engaged in the press forming of metals. This is more than just talk . . . it is an established fact, attested to by a host of satisfied customers.

The above excerpt is from a letter recently received from Mr. W. D. Tucker, General Manager of John Blue Company, Inc., Huntsville, Alabama, a leading manufacturer of farm equipment. Mr. Tucker goes on to say that since the Verson Gap Press is the largest in the plant, it is put into service on practically every application including drawing and forming steel shapes, multiple forming, punching and shearing operations.

The machine is a Verson 10-F Gap Press of 250 ton capacity. It has a 10" stroke with a 5" power adjustment and operates at 30 strokes per minute. Area of the flanged slide is 34" x 52" . . . the area of the bolster, 36" x 62". The press requires floor space of 135" x 73", is 186" high and weighs approximately 64,000 pounds.

If you'd like further proof of Verson versatility, talk to other Verson Press users. You'll come away realizing that here is more than just a press . . . here is a production process, engineered and built to provide greater efficiency and production . . . higher profit potential. Put Verson's know-how to work for you. Send an outline of your needs.

A Verson Press for every job from 60 tons up.

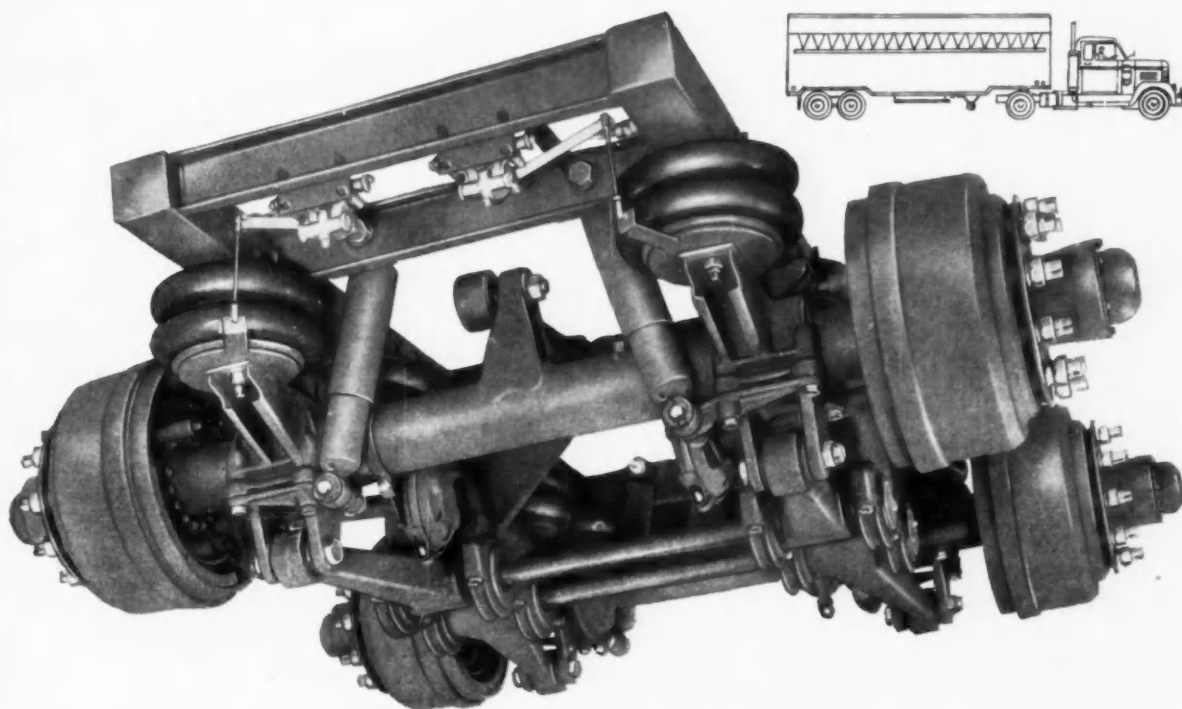


ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9307 S. KENWOOD AVENUE, CHICAGO 19, ILLINOIS • 8300 S. CENTRAL EXPRESSWAY, DALLAS, TEXAS

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES



TONS OF HIGHWAY CARGO FLOAT ON AIR

**with the new Clark Air Suspension System
for semi-trailers**

Damage to fragile goods—to perishable cargo—to empty running vehicles can be *minimized* by the new Clark Air Suspension unit.

This unique undercarriage, suitable for installation on new or in-use semis, allows both trailers and cargo literally to "float on air"!

Smooth, soft ride . . .

Doughnut-shaped "air-springs" carry full weight of trailer and cargo, absorb road shock, "flatten" even rough highways to a surprising degree. Ride actually approaches passenger-car softness!

High stability . . .

Lateral roll and sway are minimized by ingenious system of pivoted torque arms and torsion bars which take full force of side loads and absorb torsion resulting from brake torque.

Automatic load leveling . . .

When loading or unloading trailer, air reservoirs automatically adjust to support trailer bed at normal running height.

Versatile package unit . . .

All Clark Air Suspension assemblies come as complete packages, ready for installation.

tion. Parts are interchangeable between single and tandem units. Either suspension assembly can be used on new trailers or those already in operation.

Lower maintenance costs . . .

Because compressed air does the flexing and rubber mountings are employed, no lubrication is needed. Tanker operators will find that tank splitting and cracking of returning "empties" is minimized. Operators of other types of trailers will also find their trailers lasting longer and requiring less maintenance.

Weight advantages . . .

Trailer manufacturers using the Clark Air Suspension System can lighten frame and body construction, increase longevity—without sacrificing load-carrying ability.

Why not investigate . . .

Whether you manufacture highway semi-trailers or operate them . . . whether you haul eggs or engines . . . whether one trailer or a hundred are involved . . . it will pay you to get the facts on Clark's new Air Suspended Trailer Axles. Ask us for detailed, illustrated Brochure No. AS-500

CLARK EQUIPMENT COMPANY

Buchanan 2, Michigan





A New Basic Material *shaped to your specifications*

Lower costs with premixed precision moldings that meet high-production needs

Complex unit assemblies requiring details such as holes, slots, grooves, tapers and bosses are being mass-produced in record time, with record economy, at Woodall Industries Inc.

The secret is in a premixed molding compound . . . *Formadall* . . . a new sisal- or glass-fibre-reinforced material developed and produced at Woodall through *cooperative research* with major automotive manufacturers. Millions of finished parts have

been produced, at tremendous savings. You too can prove the advantages of *Formadall*—easily and quickly—through Woodall's unique prototype technique which eliminates costly experimental dies and molds. Let our engineers and chemists know about your particular cost-reduction problems!

FORMADALL FEATURES

Lightweight • Resists corrosion • Low tooling costs
Reduced heat transmission • Reduced noise transmission • Resists high temperatures • Adaptable to intricate shapes • Molded in colors • Physical properties adaptable to product requirement.

WOODALL INDUSTRIES INC.

7565 East McNichols Road, Detroit 34, Michigan

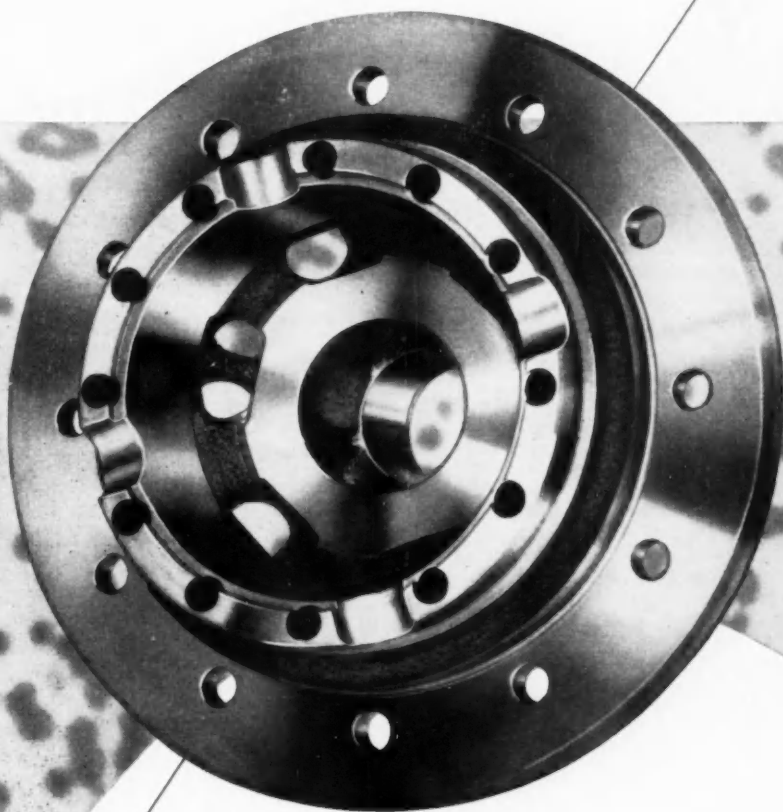
PLANTS: DETROIT AND MONROE, MICH. • SKOKIE, ILL. • FRANKLIN, OHIO • LAUREL, MISS. • SANTA CLARA AND EL MONTE, CALIF.

is your problem

machinability?

NATIONAL HTM CASTINGS

are the answer



There are many reasons for specifying HTM (Pearlitic Malleable) castings for your product. One is *machinability* of 70-90 percent (B1112 steel = 100).

But there are many other equally valid reasons. High ultimate strength . . . extreme wear resistance under heavy loads and high speeds . . . non-seizing qualities . . . air or liquid quenching . . . ability to be smooth-finished.

So when you're looking over the materials field, don't overlook the advantages of HTM castings. For HTM metal can be cast by either the shell mold, CO₂, or green sand methods. This means production costs tumble . . . performance and saleability of your product go up.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Established 1868

Cleveland 6, Ohio

The nation's largest independent producer of malleable and pearlitic malleable

Important Physical Properties

Brinell	163 to 302*
Yield, psi	48,000 to 85,000*
Ultimate, psi	70,000 to 110,000*
Elongation, %	7 to 2*

*Depending upon grade





Cape Cod in Death Valley

...thanks to an automotive air conditioning system



And whatever the system: Thermostatic by-pass . . . pressure actuated by-pass (shown at right) or any other, A-P will supply the thermostatic expansion valves, drier receivers, liquid indicators and distributors in capacities, connections and operating characteristics to match.

Pioneers in this field, A-P stands ready to assist you in all phases of automotive refrigeration control. Standard controls or specially designed units can be produced in any quantity, with every customer, large or small, benefiting from the latest research and engineering techniques employed at A-P.

And more than 400 refrigeration jobbers give you coast-to-coast replacement service. Write today for new, comprehensive bulletin.



MODEL 412 DRIER-RECEIVER with sight glass. PA-400 silica gel protects 100% against acids and moisture.



MODEL 237-A PRESSURE ACTUATED BY-PASS — Provides by-pass for car temperature control or prevention of evaporator freeze-up. Extremely compact. Available with toggle for remote control. Connections: 3/8, 1/2 or 5/8" male flare inlet, outlet.

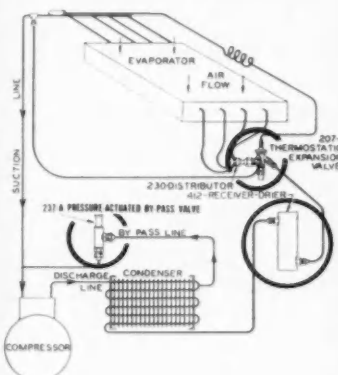


MODEL 207-C THERMOSTATIC EXPANSION VALVE — Adjustable or fixed superheat. Pressure limit on special order. Internal or external type equalizer. 1-ton or 1 1/2-ton capacities, R-12.



PRESSURE-TYPE DISTRIBUTORS — uniform flow to all circuits. Any size and number of outlet openings; also side opening for by-pass connection if required.

Pressure-actuated By-pass system



CONTROLS COMPANY OF AMERICA

Manufacturers of A-P CONTROLS

2415 NORTH 32ND ST. • MILWAUKEE 10, WISCONSIN
COOKSVILLE, Ontario • NIJMEGEN, Holland

Controls That Make Modern Living Possible

A-P CONTROLS ARE USED BY THE FOLLOWING:

Chrysler Corp.	Clardy Auto Air
A. O. Sulton Corp.	Conditioning Co.
American Motors Corp.	Climatic Air. Mfg. Co.
Ford Motor Co.	Farston Mfg. Co.
Ford Div.	Frigikar Corp.
Ford Motor Co.	Frigiquip Corp.
Mercury Div.	Parkomat Mfg. Co.
Ford Motor Co.	Mobilair Mfg. Co.
Edsel Div.	John E. Mitchell Co.
A.R.A. Mfg. Co.	Novi Equipment Co.
Capitol Refrig. Co.	Control Corp.



Large Part...Small Part ...in Natural or Synthetic Rubber...



**4-STEP
SERVICE**

ASSURES A BETTER END PRODUCT

Phoenix 4-Step Service can be of invaluable assistance in helping you utilize rubber to develop a better end product. Compounding and fabricating rubber has been a Phoenix specialty for 25 years. This concentration enables Phoenix to develop natural and synthetic rubber compounds to solve a variety of product design problems involving such factors as high and low temperature, abrasion, weather, load, torque, corrosive fluids and bonding to other materials. You can confidently put *your* rubber problem to Phoenix for an imaginative and thoroughly satisfactory solution!

*Leading Manufacturers
of Custom Molded
Mechanical Rubber*



STEP 1—ANALYSIS Phoenix studies the part to determine which will be the most suitable rubber compound.



STEP 2—DESIGN Phoenix assists in designing the part to perform the function intended at an acceptable cost.



STEP 3—COMPOUNDING Then Phoenix compounds and tests the most suitable natural or synthetic rubber.



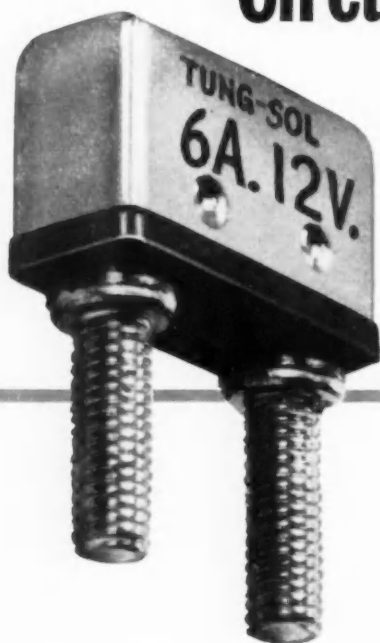
STEP 4—MANUFACTURE Modern equipment and exacting production control assure fast, accurate molding.



**RUBBER PRODUCTS DIVISION
PHOENIX MANUFACTURING COMPANY**
JOLIET, ILL. • FOUNDED 1882

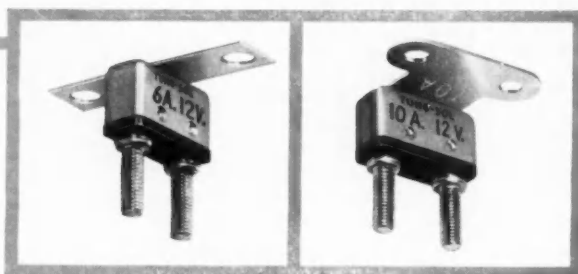
Integrated Manufacturing Facilities: RUBBER PRODUCTS DIVISION, FLANGE AND FORGING DIVISION, STEEL MILL DIVISION, STEEL BUILDING PRODUCTS DIVISION, HORSESHOE PRODUCTS DIVISION

Tung-Sol 12-Volt Remote-Reset Circuit Breakers



Positive "Lock Open" Action gives complete protection against:

**BURNED-OUT ACCESSORY MOTORS AND WIRING
PERMANENT BREAKER DAMAGE
RUN-DOWN BATTERIES**

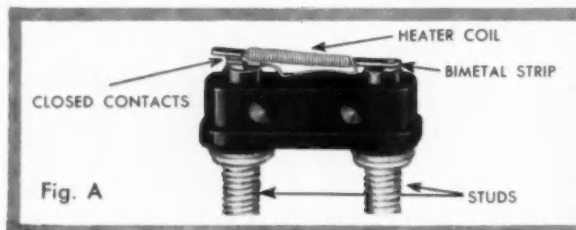


Standard Mounting Brackets

The Tung-Sol remote-reset type circuit breakers *lock open*, instead of continuing to pulsate, when the circuit is overloaded or shorted. When the cause of the overload or short is removed, the breaker is then remotely reset. It reactivates the circuit within 30 seconds.

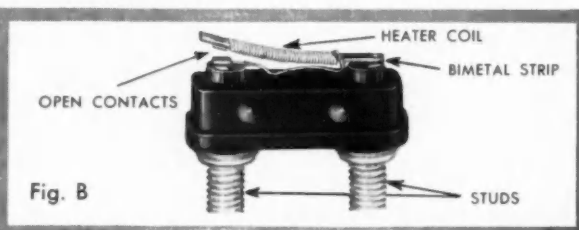
Available in 6, 10, 15, 20, 30 and 40 amp. ratings, in a choice of two mounting brackets, Tung-Sol Remote-Reset Circuit Breakers are used in a wide variety of automotive applications. For further information write Engineering Department.

METHOD OF OPERATION



NORMAL CONDITIONS

When circuit conditions are normal, the current flows thru the strip which is attached across breaker studs. When contacts are closed, the heater coil is short circuited and has no heating effect. (Fig. A).

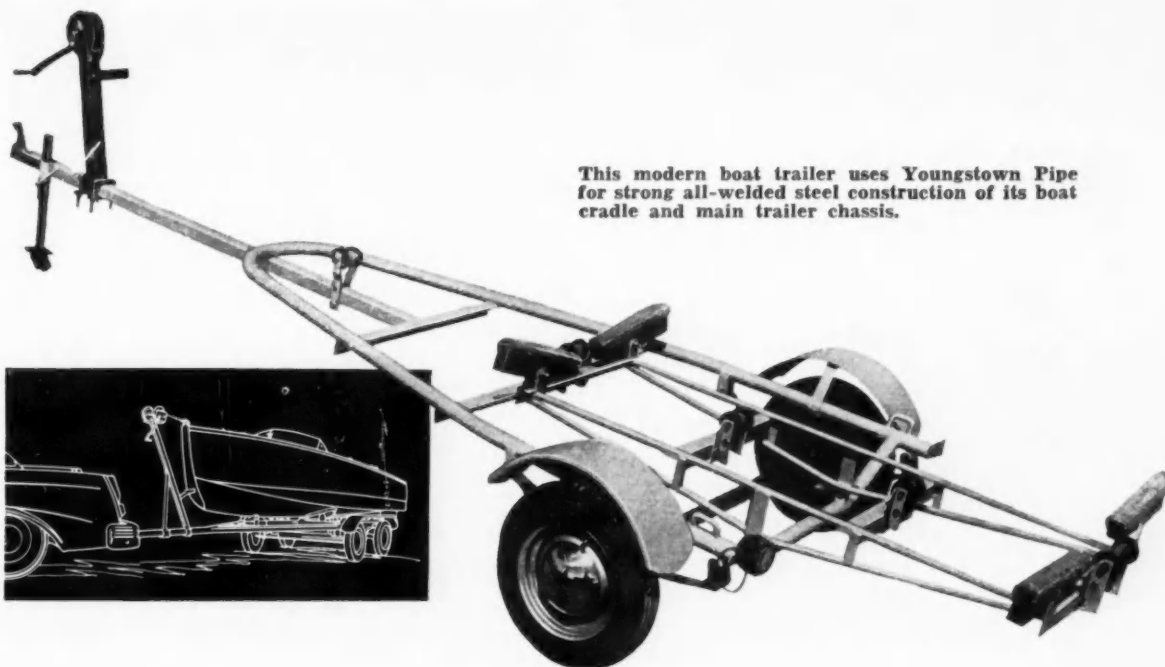


EMERGENCY CONDITIONS

When a short circuit or overload occurs, the increased current causes strip to bend away from contacts. (Fig. B). When the contacts part, the coil is automatically inserted in the circuit.

ELECTROSWITCH DIVISION  **TUNG-SOL ELECTRIC INC., NEWARK 4, N. J.**

SALES OFFICES: ATLANTA, GA.; COLUMBUS, OHIO; CULVER CITY, CALIF.; DALLAS, TEXAS; DENVER, COLO.; DETROIT, MICH.; IRVINGTON, N. J.; MELROSE PARK, ILL.; NEWARK, N. J.; PHILADELPHIA, PA.; SEATTLE, WASH. CANADA: MONTREAL, P. Q.



This modern boat trailer uses Youngstown Pipe for strong all-welded steel construction of its boat cradle and main trailer chassis.

YOUNGSTOWN CONTINUOUS WELD PIPE

... provides extra-strength chassis for
"Texan" boat trailers

Here's an unusual application for steel pipe. "Texan" Boat Trailers, produced by the Cunningham Trailer Works of Lubbock, Texas, are fabricated from Youngstown Pipe to provide users maximum cargo protection as well as greatest ease during loading, unloading and while making the haul.

In line with Cunningham's policy of using only the highest quality raw materials, they wisely specify Youngstown Continuous Weld Pipe for fabrication of both the boat cradle and main trailer chassis. This gives Texan boat trailers a sturdy welded steel construction able to withstand the most rugged use—on or off the highway. Why not use Youngstown Pipe structurally to build strength and quality into your products?

Your local Youngstown Distributor is the man to call when you want quality pipe—day or night. He has a complete stock and his on-the-spot fast delivery will help keep your operations humming along at top speed. Why not call him today?

Next time you need
pipe—for any purpose
—specify Youngstown
and secure these 7
Points of uniform
goodness

uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform wall thick-
ness and size
uniform strength and
toughness
uniform roundness
and straightness

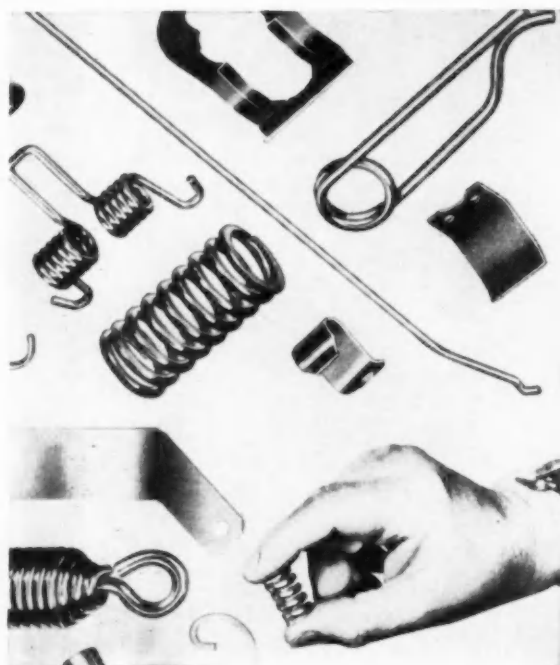


THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yaloy Steel

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities



COIL SPRING SAYS:



Perfect U. S. Steel Wire springs can help keep your rejects to a minimum while lowering your production costs.

That's because rigid quality control and close inspection are standard operating procedures in our handling of your spring jobs. Since dependable springs and better products go hand-in-hand, why not let us quote on your next spring requirement.

No order too large or too small!

The U. S. STEEL WIRE SPRING Co.

7800 FINNEY AVE. • MICHIGAN 1-6315

CLEVELAND 5, OHIO

Quantity PRODUCTION of GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE



ARRESTINGLY—NEW!

- IN — ✓ ENGINEERING CONCEPT
- ✓ PERFORMANCE CAPABILITY
- ✓ REPETITIVE PRECISION
- ✓ RUGGED DEPENDABILITY

**THE NOBURMATIC "HA"
TOOL DEBURRS FRONT AND
BACK FACES OF HOLES
IN A SINGLE ACTION.**

Retractable cutter functions automatically upon contact with the work-piece. Action is *positive* and *measured*—assuring quality and consistency of performance unmatched by any spring operative device. Operative head receives all pilot sizes interchangeably. *Investigate now!*

Representatives in

MICHIGAN

A. S. Darling
22673 Bayview Drive
St. Clair Shores
PRescott 7-9515

ILLINOIS

Dahly Tool Co.
4939 W. Fullerton Ave.
Chicago
MErrimac 7-3221

Write factory for name of your nearest dealer



NOBUR MANUFACTURING CO.

6860 Farmdale Ave., No. Hollywood, California

Cold-Finishing of Alloy Steels: The Cold-Drawing of Bars

Cold-finishing of alloy bars may be divided into two general categories: (1) cold-drawing, where the bars are pulled through a die with no surface removal; and (2) turning and grinding, which removes the surface. We shall consider the cold-drawing procedure in this discussion.

Cold-drawing is the process of pulling a pickled and limed bar through a die, which results in a bright, smooth finish of the section, combined with close tolerances: The alloy bars are prepared for cold-drawing by pickling in a hot solution of dilute sulphuric acid for removal of scale. This is followed by a water rinse, and immersion in a hot lime-water bath to neutralize the effects of the acid, and to aid in carrying special liquid lubricants into the die.

Alloy bars may be cold-drawn under four conditions: *as-rolled*, *normalized* (low-carbon grades only), *annealed* (lamellar or spheroidized), or *quenched and tempered*. These conditions are determined by the grade of alloy steel, the resultant hardness, and the mechanical properties desired for a given end use.

In cold-drawing, the alloy bar is machine-pointed, to reduce the size at one end so it will pass easily into the die opening. Otherwise, the bar is pushed or extruded into the die by an auxiliary device. A die-holder, which can be made to contain from one to four dies, is mounted in an appropriate head assembled across a "draw bench," so that from one to four bars can be drawn at the same time. The draw bench has a bed which accommodates a 4-wheel buggy with jaws that grip the pointed ends of the bars as they emerge from the dies. The buggy has a hook on one end which engages an endless chain,

thus pulling the bars through the dies for their entire length.

After cold-drawing, each bar feeds automatically into a straightening machine, and is sheared or "cracker-cut" to length on appropriate machines. Saws are used when the cross-sections of the bars are too large to be cracked or sheared, or when clean square ends are required.

Smaller sizes in the form of coils are drawn on "bull-blocks," or "wire-blocks," depending on sizes, followed by straightening and cutting on special machines.

Specifications with respect to chemical composition, grain size, hardenability, and the like, of cold-drawn alloy steels have been given long study by Bethlehem metallurgists. If you would like suggestions on cold-drawn products, or any other problem concerning alloy steels, our metallurgists will be glad to give you all possible help, without cost or obligation on your part.

In addition to manufacturing the entire range of AISI alloy steels, Bethlehem produces special analysis steels and the full range of carbon grades.

If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in the series are now available in a handy 40-page booklet, and we shall be glad to send you a free copy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



BETHLEHEM STEEL

TOUGH

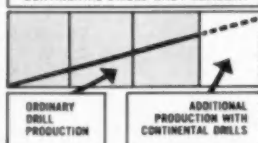
CONTINENTAL Certified DRILLS



MORE HOLES PER DRILL

Today's drilling problems on both standard and new metals require twist drills with *something extra* built into them. That's why Continental drills are so acceptable to leading *cost conscious* production plants. Ask your industrial jobber.

MAJOR PRODUCTION PLANTS PROVE CONTINENTAL DRILLS LAST LONGER!



WAREHOUSES:
NEW YORK 50 Church Street CO 7-5662
LOS ANGELES 6551 Whittier Blvd. RA 3-1287
TACOMA, WASH. 2006 Center Street MA 7-3434



CONTINENTAL DRILL CORPORATION
555 W. Adams St., Chicago 6, Illinois

FREE from an informative booklet on "WHAT CLOSED CIRCUIT TV MEANS TO YOU"

There are many applications within your organization that can be benefited by the use of closed circuit (industrial) TV. This free informative booklet gives you the complete facts on closed circuit TV—what it is—how it works—the equipment necessary—a checklist of areas that can be benefited—how industry, education, etc. use closed circuit TV.

Learn all about it today by writing:

Blonder-Tongue Labs., Inc. Dept. AI-2
9 Alling Street, Newark 2, N. J.
Please send free booklet "What Closed Circuit TV Means To You."
Company name _____
Name _____
Address _____
City _____ Zone _____ State _____
manufacturer of B-T Observer TV camera, DVM Video Monitors, Automatic Light Compensator

A Completely NEW CONCEPT of FOUR-CYCLE RECIPROCATING ENGINES

For Light Planes, Truck, Bus Tractor, Stationary or Marine Use
Now Approved By C.A.A.

- Uses half as many parts as any conventional engine with a great economy in materials and labor.
- Has many demonstrable *major improvements* not found *previously* in any other engine.

See Automotive Industries, Sept. 15, 1957, pgs. 162-3

For engineering data, technical specifications, and full information—write to

KARL L. HERRMANN
1405 AIR WAY GLENDALE 1, CALIF.

DYKEM STEEL BLUE

Stops Losses making Dies and Templates



Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301-L North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME

END NIGHT CLEANUP & MORNING REBLUING



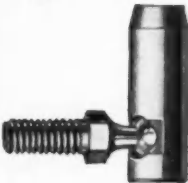
DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2301-L NORTH 11TH ST., ST. LOUIS 6, MO.


BUY BONDS

Transmit Motion This Positive Low Cost Way!

NEW TOUREK TYPE "F" BALL JOINTS



The new TOUREK Type "F" is a *non-adjustable*, low cost, trouble-free Ball Joint which permits a minimum 15° movement in any direction. It is carefully, yet simply designed to interchange with present SAE Standards. The Type "F" should be applied where the higher cost of adjustable Ball Joints has made it necessary to substitute clevises, trunions, bent rods or other less effective ways to transmit motion. Made with rubber neoprene dust cover, hardened ball screw and wear surface on shell and prepacked with Lubriplate if wanted. Ask for TOUREK Ball Joint Catalog. Use company letterhead, please.

TYPE "F"



J. J. TOUREK MFG. CO.

ESTABLISHED 1920
1901 SOUTH KILBOURN AVENUE, CHICAGO 23, ILLINOIS

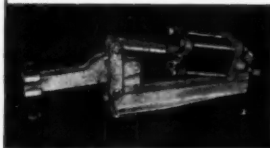
UP TO 2-5/8" DIAMETER SINGLE AND MULTIPLE SPINDLE MACHINES
THREADING * TAPPING * MILLING * DRILLING * GRINDING *
POLISHING * PLATING * HEAT TREATING * SILVER SOLDERING

WORLD'S LARGEST MANUFACTURER OF "STANDARD" BALL JOINTS



You asked for it . . .

KNU-VISE has come up with it!



AO-800 CLAMP

**TWO NEW
AIR-OPERATED CLAMPS
with 800 pound
clamping force**



AODT-800
DOUBLE TOGGLE CLAMP

Because you asked for it, Lapeer's vast line of Knu-Vise clamps now features four distinct groups of air-operated clamps. Two new 800 lb. air clamps have been added to the widely accepted 200, 400 and 1200 lb. air clamps, thereby rounding out the Knu-Vise series. The Model AO-800 clamp is for conventional holding operations—the Model AODT-800 for those difficult mounting situations.

For complete information on these units and the more than 150 other models available, write for catalog today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.

3041 DAVISON ROAD • LAPEER, MICHIGAN
WESTERN DIV.: 419 Magnolia, Glendale Calif.
CANADIAN DIV.: Higginson Equipment Sales, LTD., Burlington, Ontario

THE TREND IN DRAFTING ROOMS THROUGHOUT THE WORLD IS TOWARD IMPERIAL, THE WORLD'S FINEST TRACING CLOTH

**YOUR LARGE
SPROCKETS, GEARS
PRODUCED FASTER
AT MUCH LOWER
COST**

with
COGMATIC
precision flame
machining



- Greater accuracy, durability and economy in Cogmatic Flame Machining to produce large gears, sprockets
- Flame Machined from 1045 steel plate or rolled steel rings
- Teeth hardened to 45-55 Rockwell with 1/8" depth
- in the hardening pattern
- Cuts any size, shape of tooth and spacing to tolerances of approximately .008"
- Gear or sprocket diameters cut automatically from 10" to 240" up to 3" thick faster than machining or hobbing

Prove all this yourself. Send us blueprint or sample for free quotation and complete details.

COGMATIC DIVISION
Seaman-Andwall Corporation
Gentlemen:

Please rush complete information about Cogmatic precision flame machining for Gears and Sprockets.

Name

Title

Company

City State

COGMATIC DIVISION

SEAMAN-ANDWALL CORP.

212 North 25th Street
Milwaukee, Wisconsin

Index to

The Advertisers' Index is published as a convenience, care will be taken to index correctly. No allow-

A		E	
AC Spark Plug (Electronics Div.)	76	Eaton Mfg. Co., Dynamatic Div.	22-23
AMP Inc.	8	Enjay Co., Inc.	78
Acadia Div. Western Felt Wks.	10		
Admiral Corp. (Molded Products Div.)	103		
Allegheny Ludlum Steel Corp.	12	F	
Aluminum Co. of Amer.	146 thru 148	Fairfield Mfg. Co.	126
American Chain & Cable Co. (Automotive & Aircraft Div.)	161	Fasco Industries, Inc.	150
American Chemical Paint Co.	128	Federal-Mogul-Bower Bearings Inc.	119
Armco Steel Corp.	9	Bearings Co. of Amer.	105
		Federal Mogul Div.	123
B		National Seal Div.	46
Babcock & Wilcox Co.		Foote-Burt Co.	11
Tubular Products Div.	97	Fuller Mfg. Co.	
Beam Products Mfg. Co.	106		
Bendix Aviation Corp.: Products Div.	30	G	
Bethlehem Steel Co.	185	Gillett & Eaton Inc.	154
Blaisdell Pencil Co.	162	Gisholt Machine Co.	20
Blonder-Tongue Labs, Inc.	186	Goshen Rubber Co.	160
Borg & Beck Div. Borg-Warner Corp.	132	Grav-I-Flo Corp.	159
Borg-Warner Corp.	137	Gridley Machine Div., New Britain Machine Co.	129-130
Buckeye Tools Corp.	118	Guide Lamp Div.	27
Buffalo Bolt Co.	141		
Bundy Tubing Co.	42-43	H	
Burton Auto Spring Corp.	73	Hansen Mfg. Co.	116
Byers Co., A. M.	18	Heald Machine Co.	2nd Cover
		Herrmann Karl L. Co.	186
C		Holcroft & Co.	28
Century Gas Equipment Co.	140	Hyatt Bearings Div.	47
Chambersburg Engineering Co.	5		
Chicago Rawhide Mfg. Co.	21	I	
Clark Bros. Co. of Dresser Industries	99	International Nickel Co.	2
Clark Equipment Co.	177		
Clearing Machine Corp.	134-135	J	
Continental Diamond Fibre Div.	171	Johnson Products, Inc.	136
Continental Drill Corp.	186	Jomac Inc.	114
Controls Co. of Amer.	180		
Copperweld Steel Co.		K	
Superior Steel Div.	127	Kendall Co. (Polyken Sales Div.)	173
		Keuffel & Esser Co.	187
D			
Dana Corp. (Spicer)	157-158	L	
Delco-Remy Div.	44-45	Lamb Electric Co.	142
Denison Engineering Div. Amer. Brake Shoe Co.	163	Lapeer Mfg. Co.	187
Dow Corning Corp.	151	Lindberg Engineering Co.	17
Dykem Co.	186		
		M	
		Linde Co. Div. Union Carbide Corp.	26
		Link Belt Co.	19
		N	
		National Screw & Mfg. Co.	88
		National Seal Div.	123
		National Malleable & Steel Castings Co.	179
		National Standard Co.	24
		New Britain Machine Co. Gridley Machine Div.	129-130
		New Departure Div.	Back Cover
		New York Air Brake Co. Kalamazoo Div.	77
		Nobur Mfg. Co.	184
		O	
		Olin Mathieson Chemical Corp.	133
		Osborn Mfg. Co.	172
		P	
		Packard Electric Div.	7
		Pangborn Corp.	4
		Parker Rust Proof Co.	101
		Pennsalt Chemical Corp.	124-125
		Phoenix Mfg. Co. (Rubber Products Div.)	181
		Polyken Sales Div. Kendall Co.	173
		R	
		Ransburg Electro Coating Corp.	122
		Raybestos-Manhattan Inc. Plastic Products Div.	169

Advertisers

and not as part of the advertising contract. Every
once will be made for errors or failure to insert.

Republic Steel Corp.	174-175
Rochester Products Div.	25
Rockford Clutch Div.	156
Rockwell Spring & Axle Co. (Brake Div.)	29
Russell, Burdall & Ward Bolt & Nut Co.	143
Ryerson & Son Inc., Jos. T.	32

S

Sciaky Bros., Inc.	170
Sealed Power Corp.	115
Seaman-Andwall Corp.	187
Smith Corp., A. O.	120-121
Southern Screw Co.	131
Stewart-Warner Corp.	117
Sturtevant Co., P. A.	189
Sun Oil Co.	6
Superior Steel Div. Copperweld Steel Co.	127

T

Thompson Products, Inc.	
Jet Div.	13
Michigan Plant	16
Timken Roller Bearing Co.	40
Tinnerman Products, Inc.	14
Torrington Co.	91
Tourek Mfg. Co., J. J.	187
Townsend Co.	149
Tru-Seal Div.	189
Tung-Sol Electric, Inc.	182

U

U. S. Axle Co., Inc.	110
U. S. Steel Wire Spring Co.	184

V

Vanadium Corp. of America	190
Verson Allsteel Press Co.	176
Vickers Inc. Div., Sperry-Rand Corp.	95

W

Wagner Electric Corp.	168
Warner Automotive Div. B-W Corp.	138
Waukesha Motor Co.	1
Wausau Motor Parts Co.	164-165
Wean Equipment Corp.	153
Webb Co., Jervis B.	155
Western Felt Works (Acadia Div.)	10
Westinghouse Electric Corp.	107 thru 109, 111 thru 113
Wheland Co.	184
Woodall Industries, Inc.	178

Y

Yale & Towne Mfg. Co.	74-75
Yoder Co.	162
Youngstown Sheet & Tube Co.	183

Z

Zollner Corp.	3rd Cover
---------------	-----------



TRU-SEAL STOPS PIPE THREAD LEAKS

TEFLON SEAL

PAT. PENDING

Satisfaction Guaranteed Or Money Back TRIAL OFFER

Tru-Seal Fittings are guaranteed to seal pipe thread connections permanently against all oils, practically all known chemicals and gases; to seal under high pressures or vacuum; to withstand —280° to plus 500° F.; to eliminate "overtightening" damage and pipe dope.

\$10.00 Trial Offer No. 1: eight 1/4", ten 1/2", eight 3/4", ten 1" NPT pipe thread Tru-Seal Fittings.

\$10.00 Trial Offer No. 2: eight 1/2", ten 3/4", four 1" NPT pipe thread Tru-Seal Fittings.

Send order to

TRU-SEAL DIVISION
FLICK-REEDY CORPORATION

2028 N. Hawthorne Melrose Park, Ill.

"Miller Fluid Power" is also a Div. of Flick-Reedy Corp.



- 1 Thread Tru-Seal on pipe or fitting as far as it will go hand tight.
- 2 Thread pipe or fitting 3 threads into port. Point in desired direction.
- 3 Tighten Tru-Seal to complete leakproof assembly (only light torque required).

Only ONE Torque Wrench can be accurately used with . . .

EXTENSIONS and ADAPTERS

It is mechanically impossible to use any Torque Wrench with adapters or extensions (with accuracy) unless that Torque Wrench has a positive, built-in, fixed load position.

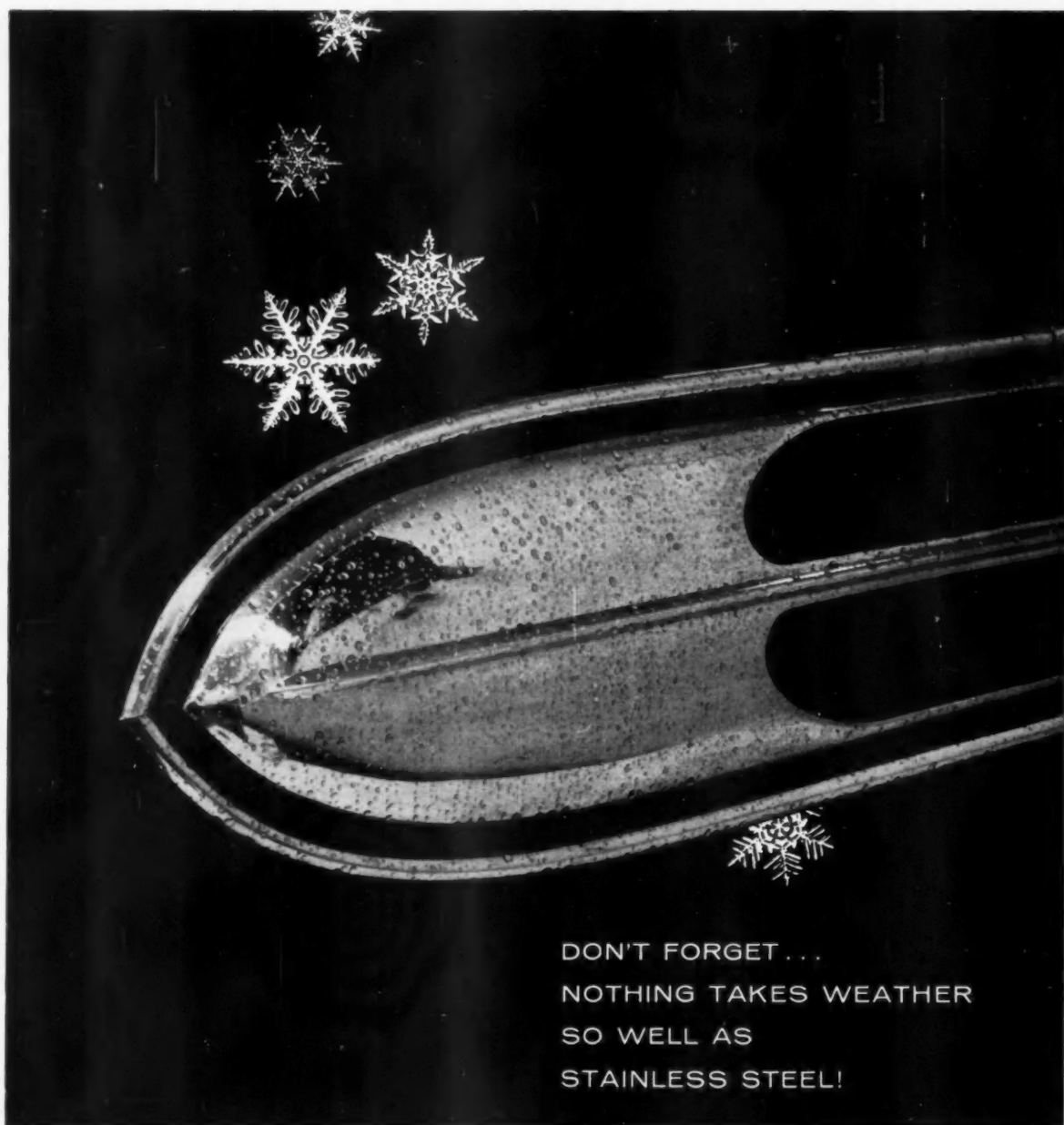
This essential factor of accuracy, misunderstood or ignored in the design and manufacture of some torque tools, can completely defeat their purpose.

**PATENTED
PIVOTED HANDLE
FIXES LOAD POSITION**



Write for Torque Manual
with formulae tables and explanations for correct use of adapters and extensions.

PA STURTEVANT CO
ADDISON QUALITY ILLINOIS



DON'T FORGET . . .
 NOTHING TAKES WEATHER
 SO WELL AS
 STAINLESS STEEL!

It's one reason why over 50% of all car buyers say that stainless-steel trim influences their buying decision. Because stainless beauty is more than skin deep, it is lasting beauty. Stainless-trimmed cars bring more in resale. The brightwork stays perfect — never rusts, peels, corrodes. It resists dents, scratches, road chemicals, too. And mere soap-and-water washing makes it bright as new. The very best stainless steels are made with Vancoram Ferro Alloys. Ask your supplier about the added appeal you can build into your cars — with *stainless steel*! Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y.

Producers of alloys, metals and chemicals



**VANADIUM
 CORPORATION
 OF AMERICA**

NEW

NEW

NEW

ESPECIALLY DESIGNED FOR TOP RING
GROOVE PROTECTION IN PISTONS
FOR GASOLINE ENGINES

AN ECONOMICAL METHOD WITH
MINIMUM WEIGHT INCREASE

CAN BE APPLIED TO ANY TYPE
ALUMINUM ALLOY PISTON



PERMA-GROOVE*

WITH SEGMENTAL STEEL TOP RING SECTION

Again, Zollner engineering leadership provides another great piston development to engine builders. The new Zollner "Perma-Groove" gives sensationally longer life to pistons and rings, prevents blow-by, minimizes oil consumption. The light weight segmental steel section incorporates high wear resistance in the top ring groove *plus* the advantage of cool operation. Designed especially for gasoline engine pistons, "Perma-Groove" is the quality, low-weight and low-cost companion to the popular "Bond-O-Loc" piston for Diesel engines. We suggest an immediate test of "Perma-Groove" advantages for your gasoline engine.

*T. M. Reg. Pat. App. For



TOP RING SECTION



FRONT VIEW SECTION



CROSS SECTION

OUTSTANDING ADVANTAGES OF ZOLLNER "PERMA-GROOVE" TOP RING SECTION

1. Individual steel segments eliminate continuous band expansion problem.
2. Segments securely locked to prevent radial movement.
3. Dovetailed edges keep steel segments securely in plane with groove.
4. 75% steel bearing area for wear resistance.
5. 25% aluminum bearing area for heat conductivity and cool operation.
6. Light in weight.

ADVANCED
ENGINEERING
PRECISION
PRODUCTION
COOPERATION
WITH ENGINE
BUILDERS

ZOLLNER

THE ORIGINAL EQUIPMENT PISTONS

PISTONS

ZOLLNER CORPORATION • Fort Wayne, Indiana

NEW DEPARTURE

NEW DEPARTURE

NEW DEPARTURE



Symbol of a Reputation

... a reputation for integrity, for quality and service ... for advanced creative engineering achieved by New Departure in over half a century of precision ball bearing manufacture.

You'll find this emblem is also symbolic of our determination to continue, in the fullest measure, all those factors which have built that reputation. It is a visual pledge of this resolution to all our customers, present and future.



*turning point of
modern industry*



NEW DEPARTURE

DIVISION OF GENERAL MOTORS-BRISTOL, CONN.